UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE EFFECTS OF TRAINING PRESERVICE TEACHERS IN CREATIVE PROBLEM SOLVING AND CLASSROOM MANAGEMENT

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

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Norman, Oklahoma
2010

THE EFFECTS OF TRAINING PRESERVICE TEACHERS IN CREATIVE PROBLEM SOLVING AND CLASSROOM MANAGEMENT

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

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Acknowledgements

I wish to offer my gratitude to the faculty and staff of University of Oklahoma who have helped me throughout each step of my academic endeavors, especially my committee members who guided me through the process and continuously encouraged me. I also wish to Gina and Krystal, whom I could count on to be sure paperwork was completed and a room was reserved for my research and meetings. I offer a special thanks to the technology department for their contribution above and beyond what is expected; thanks Ron and Chad.

I wish to offer my gratitude to my awesome friends and colleagues at University of Oklahoma, especially Michelle Cox, Pennie Vargas, Penny Cantley, and Susan Adams-Johnson; who always encouraged me, prayed for me, and willingly gave of their time to help me in all my endeavors. I could ask for no better friends and colleagues; I will think of them often as I continue my scholarly journey.

I am grateful to all my family who believed in me and encouraged me along my chosen path. A special thanks to my sister, Sue, who taught me to explore the world through reading at a very early age and continues to support and encourage me in all my endeavors. To my brother, Tony, who inspired my fascination of travel, culture, and challenge while serving in the United States Air Force and taught me that success is directly proportional to the effort expended. I offer a special thanks to my son, Christopher, who taught me to dream big, hope, and always have faith in God.

Most importantly, I offer my deepest thanks to my dearest friends, Paul Rhoads, Lana Rhoads, and Amy Claxton, who saw my potential long before I realized it and continue to encourage me as I begin a new chapter in my life. They are my inspiration

for completing my Ph.D. and will always be my role models. Finally, I offer a special thanks to Virginia Claxton, “Momma C” who knew just what to say and when to say it as I worked through this project.

This would not have been completed without the love, support, and encouragement of my faculty, colleagues, friends, and family members that supported me. Each one will forever hold a special place in my heart. I thank God for placing each of these wonderful people in my live and giving me the wisdom to learn the valuable lessons I have learned from them.

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Abstract

The purpose of this study was to examine the effectiveness of teaching a specific creative problem solving model to preservice teachers. The study included 74 participants, 67 females and 7 males enrolled in an undergraduate educational psychology course in a Mid-western university. In a 2 x 2 full factorial design, participants were randomly assigned to either a treatment group or a control group in both classroom management training and creative problem solving training. Participants received one hour training in either creative problem solving or an alternate creativity treatment and 12 hours of classroom management training either before or after one of the creativity treatments. The covariates included were academic aptitude as indicated by self-report of the American College Test score, a fluent thinking score as measured by the *Consequences* measure, and domain-specific aptitude as indicated by the results of a course exam. The dependent variables were the gain scores between the pretest and posttest of the creative problem solving tasks for each of five components, (originality, usefulness, elaboration, application of creative problem solving, and application of classroom management). Both MANOVA and MANCOVA were conducted to determine any significant differences in scores on creative problem solving tasks among the groups. A significant difference was found between those receiving creative problem solving training and those receiving the control treatment on two factors of the creative problem solving tasks. The participants who had received creative problem solving training had lower scores on elaboration and higher scores on application of creative problem solving strategies. There were no other significant differences. This study aligns with previous research that indicates that creative problem solving can be

taught. Implications are that a short, concise model of creative problem solving can be effectively taught to preservice teachers as a pro-active measure for enhancing preservice teacher creative problem solving skills. Future studies may need to include large populations and longitudinal studies to determine retention of knowledge and application of the training as teachers.

Chapter I

The Effects of Training Preservice Teachers in Creative Problem Solving and Classroom Management

The purpose of this study was to examine the effectiveness of teaching a specific creative problem solving model to preservice teachers when coupled with training in classroom management. The study is a 2 x 2 factorial design. For this study, I adopted the definition of classroom management as "the actions teachers take to create an environment that supports and facilitates both academic and socio-emotional learning" (Evertson & Weinstein, 2006, p.4). This definition includes, but is not limited to, the tasks of classroom furniture arrangement and procedures to control the physical movement in the classroom, modifying student behavior in the classroom through rules and procedures as well as modeling and encouraging self-regulation. This study utilizes the portion of classroom management related to teaching students to self-monitor behavior.

The three research questions of the study were (1) Does training in creative problem solving improve posttest creative problem solving performance? (2) Does training in classroom management improve posttest creative problem solving performance? (3) Does training in both creative problem solving and classroom management improve posttest creative problem solving performance beyond that of either creative problem solving or classroom management alone? The creative problem solving model I chose for this study is a revision of the well-known Osborn-Parnes Creative Problem Solving model. I chose the Osborn-Parnes Creative Problem Solving model because it is has been proven to be a successfully adaptable model.

Rationale for the Study

For decades, administrations, many state departments of education, teacher educators, and teachers all across the country have agreed that inefficient classroom management skills are a major problem for teacher retention and effective teaching (Browers & Tomic, 2000; Ingresoll & Smith, 2003; Oliver & Reschley 2007; Ryan 1986). Ryan (1986) suggested that managing student behavior is one of the most difficult problems for first-year teachers to solve. Ingresoll and Smith, (2003) reported approximately 10% of their sample of teachers who left teaching cited student discipline problems as the reason for leaving. Browers & Tomic (2000) reported classroom management problems as a major concern for new teachers.

Marzano and Marzano (2003) posited that classroom management has been identified as an important part of teaching and cited various meta-analyses from 1993 to 2002 that supported the importance of effective classroom management through findings of higher student achievement scores, lower discipline problems, and less stressful work environment for the teacher to support their claim. Hanson (1998) identified seven interdependent aspects of classroom management including knowing current classroom management strategies and techniques. Hanson (1998) stated if one of the seven aspects is neglected, then effective classroom management is compromised. Emmer & Stough, (2001) listed the following aspects of classroom management as important: knowing the current research and theories of classroom management for establishing and maintaining order, knowing the psychological and learning needs of students individually and as a group, and knowing how to use a range of counseling and behavioral methods such as

prompt feedback to assist students with behavior problems and maintaining the pace of class activities. According to Everston and Weinstien (2006), classroom management requires teachers to meet two criteria; establish and sustain an orderly environment, and enhance the social and moral growth of students. The 2008 National Council for Accreditation of Teacher Education (NCATE) standards contain aspects of classroom management as part of the standards for the teacher education certification programs (National Council for Accreditation of Teacher Education, 2008). At least one of the standards includes aspects of classroom management aspects related to this study. Standard 1g.indicates a teacher is at the "acceptable" level when the teacher possesses "an ability to demonstrate classroom behaviors that create caring and supportive learning environments and encourage self-directed learning by all students."

Scholars have found that teachers who use their creative ability to solve various classroom problems are more effective in their teaching and are less likely to choose to leave the profession (Esquivel, 1995; Feldhusen and Kolloff, 1986; Ryan, 1986; Simplico, 2000). Davidovitch and Milgram (2006) found a positive correlation (r=.64) between creative thinking and teacher effectiveness in solving realistic classroom problems. Chant, Moes, and Ross (2009) posited that teaching creative problem solving is a useful process for generating innovative curriculum and creative activities that will help students of the elementary and secondary classroom learn content of subjects as expected by state guidelines. For all these reasons I chose to focus the creative problem solving intervention in this study on the development of preservice teachers' classroom management abilities.

Literature Review and Classification of Terminology

In the following pages I will review key pieces of the research literature that support this study. Additionally I will introduce important terms that will be used throughout this study. At the end of this section I will tie things together with a specific focus on the present study.

Studies have supported the proposition that creative problem solving can be successfully taught to educators and other school officials (Basadur, Graen, & Green, 1982; Dow & Mayer, 2004; Esquivel, 1995; Fontenot, 1993; Gordon, 1956; Osborne, 1963; Parnes & Meadow, 1959; Osborn & Mumford, 2006; Prince, 1970; Reilly, 2008; Renzulli, Owen & Callahan, 1974). Puccio, Firestien, Coyle and Masucci (2006) report on various studies in which creative problem solving training in education supported an improvement in problem solving skills. Combinations of training of behavioral interventions and creative problem solving have been effective for improving various aspects of classroom management, including individual student behavior management for teachers (Choi & Lee, 2007 Curtis & Metz, 1986). Creative problem solving models and strategies have been, and continue to be, successfully taught to teachers across the nation as part of the three tier model of the Response to Intervention (RtI) component of the 2004 revision of the federal regulation known as "No Child Left Behind." An important aspect of RtI is assessing students with academic and behavioral problems, which is a key aspect of classroom management (Bloomberg, 2010; Batsche, Curtis, Dorman, Castillo, & Porter, 2007; Carney and Stiefel, 2008; Kovaleski & Glew, 2006; Peterson, Prasse, Shinn, & Swerdlik, 2007; Saylor, 2009; Wedl, 2005). Based on the research discussed in this section and a plethora of research more loosely related to the two areas of concern,

but not included in the scope of this study, I completed an experimental study to examine the effects of a specific creative problem solving training and classroom management training for preservice teachers.

As discussed, there is ample evidence to support that classroom management is a vital skill needed by teachers as they first enter the classroom. Many administrators and professional organizations that guide education policy are aware of the importance and are taking positive action once educators are in the classroom. Unfortunately, studies have shown that preservice teachers and early career teachers are less than prepared for the classroom management tasks that are a major part of teaching (Brock & Grady, 1996; Gates, Pereira, Gentry, & Mann, 2009; Houston & Williamson, 1993; Silvestri; 2001; Stoughton, 2007). A possible answer to this problem might be to incorporate creative problem solving training into the teacher preparation program so that future teachers have the necessary skills of creative problem solving and learn how to apply the knowledge of classroom management theories to student behavior problems. This is a report of a foundational study that explores that possible solution.

Problems and Problem Solving

Isaksen, Dorval, and Treffinger, (2011) defined problem solving as "a process of closing the gap between what is and what is desired. It is the act of answering questions, clearing up uncertainties, or explaining something that was not previously understood" (p.19). Along the same line, Jonassen (2004) suggested that problem solving is a goal-directed sequence of cognitive processes which requires (a) having the knowledge and cognitive abilities to construct the problem into personally understandable terms, (b) having the procedural knowledge of how to perform the needed tests or problem solving

activities, and among other things, (c) having the evaluative knowledge of when and where to perform the needed activities. He also suggested that problem solving requires the problem solver to actively engage in cognitive processes to generate, think through, and evaluate each step of the possible solution before actually implementing the solution. Anderson (2005) suggested problem solving involves having a goal, creating subgoals, and applying the correct operation or activity to achieve each subgoal. This list of requirements would also imply the problem solver has various types of expertise or knowledge that can be actively combined by the problem solver to achieve an overall goal.

Based on these ideas, I have chosen to define the term *problem* as the difference between a current state of being and a desired state of being (Anderson, 2005; Forbes, 1996; Jonassen, 2004; Runco, 2007; Treffinger, Selby, & Isaksen, 2008). Intuitively the term *problem* is associated with negativity; however this is not always correct (Runco, 2007; Treffinger, Selby & Isaksen, 2008). For example, having the problem of how to invest a bonus, deciding between two great jobs offered, or creating new procedures for classroom behavior in a teacher's first classroom are often considered positive problems. There are many different types of negative and positive problems; and, each type of problem may vary in structure, complexity, and stability between contexts or over time (Brophy, 2006; Jonassen, 2004; Runco, 2007; Wakefield, 1992, 2003). Jonassen, (2004) suggested problems could be best explained as being on a continuum ranging from well-defined problems to ill-defined problems.

Well-defined problems. Well-defined problems are written or expressed in terms that allow the problem solver to easily identify the problem, and frequently, to easily

identify the procedure for solving the problem. Well-defined problems can easily be solved by using a heuristic or algorithm that leads to one specific, convergent solution (Jonassen, 2004). A well-defined problem usually has one correct answer. According to some scholars, well-defined problems require convergent thinking and flowing convergent procedures; but ill-defined problems require the combination of convergent and divergent thinking before implementing the actions to solve the problem (Jonassen, 2004; Runco, 2007).

Ill-defined problems. Ill-defined problems are written or expressed in terms that may provide neither a clear identification of the problem nor allude to a particular strategy for solving the problem. Ill-defined problems may have many correct answers, depending on the context of the problem. Ill-defined problems are often reflective of problems frequently encountered in daily life, such as those encountered in the classroom (Anderson, 2005, Jonassen, 2004). Classroom management problems can be difficult to solve because classroom management problems frequently have unique components based on the student, the environment, and the expertise of the teacher; a solution that worked for one situation may not work for a very similar situation due to the persons involved (Bloomberg, 2010; Saylor, 2009; Wedl, 2005). Because the same solution will not always solve the problem, classroom management problems are often considered ill-defined problems and require problem-solving strategies rather than a set of algorithms or heuristics that are best used to solve well-defined problems.

Problem-solving and creative problem solving

The terms *problem solving* and *creative problem solving* are often used interchangeably in the literature; however, there is enough research to suggest that the terms do have slightly different meanings (Anderson, 2005; Brophy, 2006; Jonassen, 2004; Patterson & Zibarras, 2009; Parnes, 1961; Reiter-Palmon, Mumford, O'Conner Boes, & Runco, 1997; Runco, 2004; Ryan, 1986; Treffinger, Selby, & Isaksen, 2007). The Creative Education Foundation, founded by Osborn and later directed by Parnes, stated "Creative Problem Solving is a proven method for approaching a problem or a challenge in an imaginative and innovative way. It's a tool that helps people re-define the problems they face, come up with breakthrough ideas and then take action on these new ideas" (Creative Education Foundation, 2010). This definition is vague, but implies that creative problem solving is a systematic process of using creative thinking to identify or define a problem, generate ideas, and implement the idea or ideas to solve the problem. Creative problem solving is a type of problem solving or an approach to solving problems and is most often associated with ill-defined problems (Brightman, 1980; CEF, 2010; Isaksen, Dorval, & Treffinger, 2011, Treffinger, Isaksen, & Dorval, 2000).

Importance of Training in Creative Problem Solving

If a person has higher levels of domain-specific knowledge, but does not possess creative problem solving skills then utilization of the domain-specific knowledge may be less effective (Renzulli, Owen, & Callahan, 1974). Studies have shown novice creative problem solvers can demonstrate improved ability in creative problem solving when training of creative problem solving techniques was implemented (Basadur et al, 1982; Dow & Mayer, 2004; Esquivel, 1995; Fontenot, 1993; Reilly, 2008). Programs utilizing

strategies such as cognitive modeling and instructional modeling have been shown to improve teachers' problem identification skills, a very important first step in successful creative problem solving, regardless of the creative problem solving model (Cleven & Gutkin, 1988; Curtis & Watson, 1980; Parnes, 1961). Teaching techniques for generating alternative solutions to problems has also proven successful (Revels & Gutkin, 1983; Torrance & Torrance, 1978). Combinations of training of behavioral interventions and creative problem solving have been effective for improving various aspects of classroom management, including individual student behavior management (Chant, Moes, & Ross, 2009; Curtis & Metz, 1986). Unfortunately the studies are limited in number and in design; and furthermore, most studies have addressed only single components of the problem-solving process, such as increases in problem identification skills (Allen & Blackston, 2003).

Organized training in creative problem solving processes improves the creative thinking abilities associated with creative problem solving at the novice level (Basadur, Graen, & Green, 1982; Bransford, 1993; Chi et al., 1988; Harrington. Quinn-Leering, & Hodson, 1996; Milgrim & Hong, 1989; Mumford, Baughan, & Sager, 2003; Schraw Dunke, Bendixon, 1995; Shin, Jonessen, &MaGee, 2003; Vincent, Decker, & Mumford, 2002; Wang and Horng, 2002; Weisberg, 2006). If acquiring creative problem solving skills is a developmental process, teaching the foundational concepts and providing practice as part of teacher preparation might be beneficial. Below I describe the model of creative problem solving that was used in the present study.

A Model of Creative Problem Solving

There are many models of creative problem solving available. Most can be summarized as a process of identifying the problem, generating ideas for a solution, selecting a solution, and developing a plan of implementation. Some go further and explicitly include processes of combining knowledge at different phases or adding assessment of the plan once implemented (Finke, Ward, & Smith, 1992, Houtz and Speedie, 1978; Hunter, Beddell-Avers, Ligon, Hunsicker, & Mumford, 2008; Kemp & Hall, 1992; Molloy & Pierce, 1990; Mumford, Antes, Caughron, Connelly, and Beeler, 2010; Mumford, Baughman, & Sager, 2003; Mumford, Antes, Caughron, Connelly, and Beeler, 2010; Mumford & Connelly, 1994; Mumford, 2001; Mumford, Baughman, & Sager, 2003; Mumford, Waples, Antes, Brown, Connelly, Murphy & Devenport, 2010; Reiter-Palmon, Mumford, O-Conner Boes, & Runco, 1997). Scholars have also found that many different cognitive processes are used when actively engaged in creative problem solving, such as various types of reasoning, ways of organizing information, application of previous and new knowledge, or evaluating ideas (Baer, 2003; Brown, Bransford, Ferra, & Campione, 1983; Cho & Jonassen, 2002; Jonassen, 2004; Pierce, 1900; Shin, Jonessen, MaGee, 2003; Voss, Wolfe, Lawrence, Engle,1991; Vincent, Decker, & Mumford, 2002).

What seems apparent in most models are the foundational components of identifying the problem, generating possible answers, and designing an implementation of a solution. Depending on the creative problem solving model used as a basis for the process, a creative problem solver may engage in the cognitive processes of combining knowledge and generating ideas in a slightly different order or may even employ

different cognitive processes for two very similar problems. It is important to reiterate that creative problem solving models are only helpful if the problem solver has content knowledge related to the problem. The more knowledge up to a certain point, the more likely a problem can be successfully solved (Jonassen, 2004; Patterson & Zibarras, 2009; Parnes, 1961, Runco, 2004; Treffinger, Selby, &Isaksen, 2008).

I chose to use the Osborn-Parnes Creative Problem Solving model for my study because I had several years of personal success using this model when working with co-workers solving production quality concerns in a manufacturing setting and because it has been proven successful as a flexible model of creative problem solving in industrial, organizational, and educational settings. Studies have shown this process to be an effective set of cognitive strategies for improving creative problem solving scores (Basadur et al, 1982; Dow & Mayer, 2004; Esquivel, 1995; Fontenot, 1993; Gilbert et all, 1996; Reilly, 2008; Renzulli & Callahan, 1974).

The Osborn-Parnes Creative Problem Solving Model was originally designed by Alex Osborn (1963). Sidney Parnes continued to work on and improve the model. The Osborn-Parnes Creative Problem Solving Model has three main components or stages with additional substages in the first and third stage. I have provided a summary of the model used in Table 1, however, a much more complex diagram of the original Osborn-Parnes Creative Problem Solving model can be found in Appendix A.

Table 1

Components of the Osborn-Parnes Creative Problem Solving Model

Main Component	Sub-Component
Identify the Problem	
	Objective finding – Determining the challenge or goal
	Fact finding- Gathering and evaluating information for relevance or irrelevant
	Problem-finding – Clarifying the problem
Generate Ideas	
	Generate ideas
Plan for Action	
	Solution Finding – Determining which of the ideas that were generated would be the best solution
	Acceptance Finding- Planning for action and designing an implementation

Problem Identification. The first stage of the Creative Problem Solving model is labeled as problem identification. Problem identification includes three sub-stages. The first sub-stage, objective finding, allows the creative problem solver to arrange the information so that the problem is more easily identified or clearly defined. The second substage, data finding, is used by the creative problem solver to identify the relevant details and facts; which means disregarding any irrelevant information. The third sub-stage, problem finding, occurs when the creative problem solver clearly and explicitly states the correct problem.

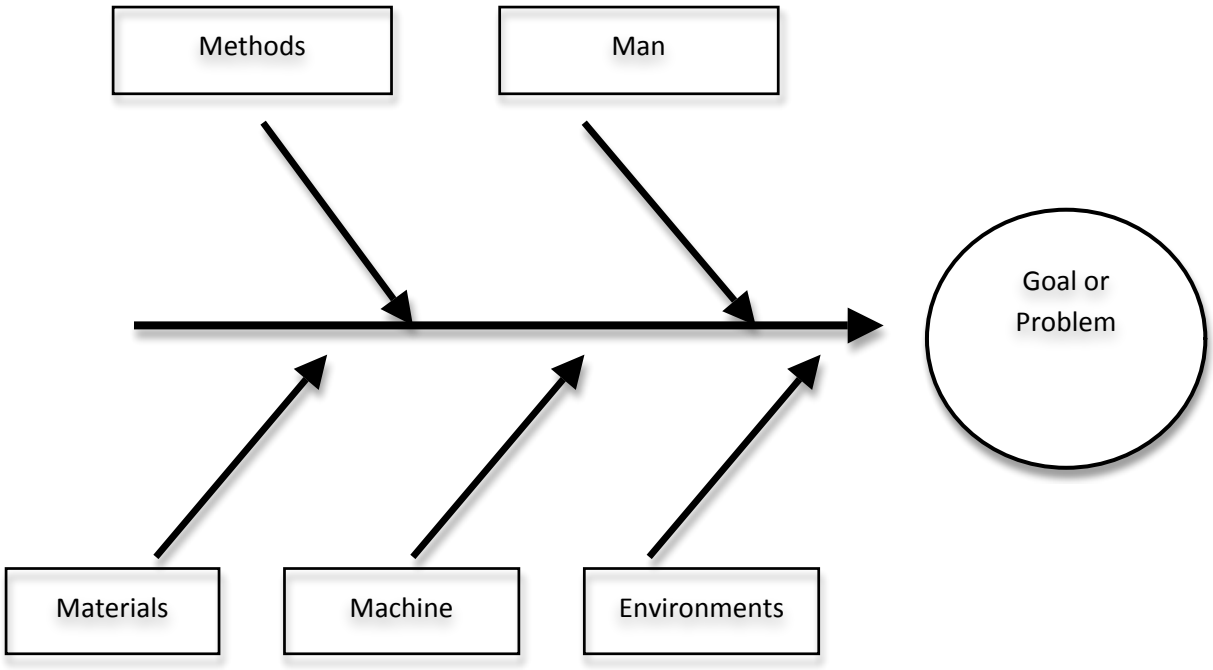
Generating Ideas. The second component of the Creative Problem Solving model is a single stage of generating ideas. Creative thinking is often used to generate the many ideas that could be implemented as the chosen solution. Generating new and useful ideas in the creative problem solving process is dependent upon convergent and divergent thinking. This requires having expertise in one or more domains from which to draw knowledge that can be transferred or combined to create possible solutions.

Although several strategies for generating and organizing ideas have been reported for this stage, Osborn did not indicate a specific technique or strategy in the original model. One strategy that has been proven effective in the field of manufacturing is the fishbone strategy also called the Ishikawa diagram because Kaoru Ishikawa developed this technique in 1943. The fishbone process has been modified for use in many different contents and may be easily modified for educational settings.

The fishbone strategy began as a tangible cause-and-effect diagram to help employees organize thoughts as to possible causes for a problem, but has also been used to organize ideas for solutions. The diagram, as shown in Figure 1, is a skeletal fish diagram. Lines or "bones" are used to list ideas generated in four or five areas of thought; guiding the creative problem solver to transfer or combine information from different domains or areas of thought.

Figure 1

The Fishbone



Most common factors in problem solving for the manufacturing field are man-material-machine-environment; however some have used the domains of people, place, procedure, and policies (North Carolina Department of Environment and Natural Resources, 2002). In this study the areas were adapted to people -behaviors- resources-equipment-environment. This allowed the participant to consider many different domains when problem-solving. After each bone is labeled, the creative problem solver lists as many ideas related to each area as possible. The creative problem solver may move from one area to another, listing ideas in the appropriate area as ideas are generated. This strategy provides some structure to the idea generating stage as suggested by Parnes (1961). This

process aligns with the concept of idea combination mentioned in some research (Mumford, Baughman, & Sager, 2003). After generating as many ideas as possible the creative problem solver moves into the final stage, planning for action.

Planning for Action. The final stage of the Osborn-Parnes Creative problem–solving model is planning for action and is divided into two sub-stages, the solution finding sub-stage and the acceptance finding sub-stage. During the first sub-stage the creative problem solver elects the most appealing or practical solutions and ranks them in perceived priority. This helps the creative problem solver select the best solution, thus moving into the final sub-stage of creative problem solving.

According to Parnes (1961), a solution must be implemented before the problem can be considered solved; therefore, the creative problem solver must create an effective plan for implementing the chosen solution. This requires the final sub-stage to be completed. In the acceptance finding sub-stage, the creative problem solver elaborates the chosen idea into a workable solution. During this sub-stage, the creative problem solver considers all details of each step or phase of the solution. This includes explicit details such as products, procedures, times, dates, places, individuals directly and indirectly involved as well as all possible internal and external resources and possible internal or external hindrances that might need to be addressed either before or during the implementation of the chosen solution. Although discussed in the training used in this study, this substage was not practiced due to time limitations and the nature of the study.

Regardless of the view of how to categorize the various cognitive processing activities, it is apparent certain cognitive strategies used in the beginning stages of creative problem solving rely on general knowledge and thinking more broadly or

generally; whereas the final stages of creative problem solving requires a more focused thinking style of domain-specific context to finalize the solution. Successful creative problem solving requires expertise in creative problem solving strategies, expertise in declarative and procedural knowledge of the problem domain, and an ability to transfer the appropriate knowledge to solve a new problem (Anderson, 2005; Jonassen, 2004; Mumford, Baughman, & Sager, 2003; Runco, 2006; Weisberg, 2006). As previously explained, teachers need expertise in classroom management, as well as some level of expertise in creative problem solving in order to be effective classroom managers.

Domain Expertise

For the purpose of this paper, expertise is defined as the acquisition and consolidation of a set of skills needed for a high level of mastery in a domain (Sternberg, 1999; Weisberg, 2006). The term domain refers to any specific area of knowledge that includes a body of interrelated information and a specific set of skills (Ambrose, 2005). The expert has acquired and can utilize declarative and procedural knowledge appropriately (Cho & Jonassen, 2002; Ericsson & Smith, 1991; Jonassen, 2004; Sternberg, 1998). This includes the ability to rapidly perform domain-specific procedures, easily comprehend, assimilate, apply, and evaluate complex information in a conscious effort to create useful and well-organized information. Experts also demonstrate superior short-term and long-term memory of the information while using appropriate strategies to solve problems (Ericsson & Smith, 1991; Jonassen, 2004). Sternberg (1998, 1999, 2000) indicated that difference between a novice and an expert could be viewed as a continuum, on which the expert level may never fully be achieved.

Other scholars have suggested an individual needs at least ten years of practice and study within a domain to develop sufficient mastery of the information and skills to be considered an expert (Gardner, 2000; Hayes, 1985; Sternberg, 2000).

Weisberg (2006) posited that expertise was a combination of studying and training to develop not only a mastery of the content of a domain but also to incorporate all knowledge, regardless of domain, acquired through years of formal and informal training. For example, domain-specific knowledge of arithmetic, language, and logic are foundational for a chef to master the art of fine cooking. The same concept could be applied to solving a classroom management problem. If a teacher is experiencing a student behavior problem, the teacher may need to transfer knowledge of what he or she experienced as student in the classroom (domain-general knowledge), knowledge of child development (domain- specific knowledge) and classroom management theories learned while attending college (domain-specific knowledge) to solve a current problem. The ability to transfer or combine knowledge from more than one domain to solve a problem is dependent upon how well the knowledge is learned; too little knowledge results in the expert not readily having the information available and too much expertise results in the expert not being flexible in generating solutions (Anderson, 2005; Anderson & Schunn, 2000; Klein, 1996; Novick, 1988; Weisberg, 2006). As in the previous example of a teacher needing to solve a classroom behavior problem, if the teacher does not have a level of knowledge in one or more domains where the information can be easily transferred or combined, then the teacher is lacking information that might help generate new ideas that could lead to a successful solution.

Teachers as creative classroom management problem solvers

Scholars have found that teachers with creative problem solving skills are more effective as teachers (Esquivel, 1995; Davidovitch and Milgram, 2006; Feldhusen and Kolloff, 1986; Ryan, 1986; Simplico, 2000). There is evidence that although teachers develop creative problem solving simply through years of practice, some aspects of teachers' creative problem solving is based on learning to combine academic subject knowledge with teaching skills and transferring that new knowledge to new situations that occur each day. Explicitly teaching creative problem solving skills and classroom management principles while providing practice in college courses for preservice teachers may be beneficial for teachers' early career abilities as creative solvers of classroom management problems.

Research Questions

As presented in this section, administrators and teachers are well aware of the need for teachers to be good creative problem solvers in the classroom (Chant, Moes, and Ross, 2009; Davidovitch and Milgram, 2006; Esquivel, 1995; Feldhusen and Kolloff, 1986; Ryan, 1986; Simplico, 2000). Research has shown that leaders in state departments of education, administrators, teacher educators, teachers, and frequently, preservice teachers all across the country have agreed that inefficient classroom management skills are a major problem for teacher retention and effective teaching (Browers & Tomic, 2000; Emmer & Stough, 2001; Everston, Emmer, Sanford, & Clements, 1983; Ingresoll & Smith, 2003; Marzano & Marzano, 2003; Oliver & Reschley 2007; Ryan 1986). There is evidence to show that creative problem solving strategies can be and are being successfully taught to teachers to manage classroom behavior and

meet federal guidelines (Basadur, Graen, & Green, 1982; Bloomberg, 2010; Batsche, Curtis, Dorman, Castillo, & Porter, 2007; Carney and Stiefel, 2008; Dow & Mayer, 2004; Esquivel, 1995; Fontenot, 1993; Gordon, 1956; Kovaleski & Glew, 2006; Parnes & Meadow, 1959; Peterson, Prasse, Shinn, & Swerdlik, 2007; Osburn & Mumford, 2006; Osborn, 1963; Prince, 1970; Reilly, 2008; Renzulli, Owen & Callahan, 1974; Puccio, Firestien, and Masucci, 2006 Saylor, 2009; Wedl, 2005).

Based on the available literature on both topics, I planned a study of the effects of creative problem solving and classroom management training with a focus on student behavior modification. The study was a 2 x 2 factorial analysis with three research questions. (1) Does training in creative problem solving improve posttest creative problem solving performance? (2) Does training in classroom management improve posttest creative problem solving performance? (3) Does training in both creative problem solving and classroom management improve posttest creative problem solving performance beyond that of either creative problem solving or classroom management alone? The design of the study required participants to be enrolled in a particular educational psychology course and randomly assigned to one of four groups for the study. This was a blind study. Some data were collected online as pretest and posttest of training and other data were gathering as pencil-and-paper test as pretest and posttest. The responses of the creative problem solving training were scored based a specific technique used in studies of creativity in which expert raters score responses. Data from the classroom management training were assessed by using computer software.

Chapter II

Methodology

The purpose of this study was to examine the effectiveness of teaching a specific creative problem solving model and a set of classroom management theories on the creative problem solving performance of preservice teachers when given classroom management problems to solve. Three research questions were generated. The first research question was," Does training in creative problem solving improve posttest creative problem solving performance?" The second research question was "Does training in classroom management improve posttest creative problem solving performance?" The third research question was, "Does training in both creative problem solving and classroom management improve posttest creative problem solving performance beyond that of either creative problem solving or classroom management alone?"

Although it is impossible to provide a high level of expertise in a short time period, it is possible to provide the fundamental information about new procedures and enough practice that individuals can begin to develop expertise. As discussed earlier, there is evidence to indicate that direct instruction or modeling of creative problem solving techniques can be used to improve creative problem solving abilities; however, previous discussion also indicated the need for both domain-general knowledge and some level of expertise in a specific content domain for effective creative problem solving.

The choice of classroom management as the problem domain was made based on three reasons. First, the problems tend to be more ill-defined than well defined, making

creative problem solving more relevant than in domains involving well-defined problems. Second, the domain of classroom management is particularly salient to the participants in this study; preservice teachers enrolled in an educational psychology class. There is literature to indicate preservice teachers list classroom management as one of their major concerns, thus they are likely to understand the importance of classroom management training (Brock & Grady, 1996; Gates, Pereira, Gentry, & Mann, 2009; Houston & Williamson, 1993; Silvestri; 2001; Stoughton, 2007). Third, solutions to classroom management problems can be evaluated for their quality against guiding principles that are taught to the participants, which provides an important dimension for the study.

Research Design

This was a 2 x 2 full factorial design examining the effects of creative problem solving and classroom management training on preservice teachers' classroom management problem solving performance. The study was done using two treatments; training in creative problem solving and training in classroom management. One half of the participants were randomly assigned to receive one of the two creative problem solving treatments prior to classroom management training and the remaining half were randomly assigned to receive each of the two creative problem solving treatments after receiving classroom management training. This created four groups as shown in Figure 2: (1) a control group; (2) a group with creative problem solving training only (CPS group); (3) a group with classroom management training only (CMT group) and (4) a group who received creative problem solving training and classroom management (CPS+CMT group).

Figure 2

Treatment Groups

		Creative Problem Solving Treatment	
		No	Yes
Classroom Management Treatment	No	Control Group	CPS Group
	Yes	CMT Group	CPS + CMT Group

The design of this study included the following covariates; (1) self-reported college entrance exam (ACT) as an indicator of general academic aptitude, (2) fluency scores were used to measure entering creative ability, and (3) scores on the first exam in the educational psychology course as a measure of domain-specific ability in educational psychology. The dependent variables included the gain scores between pretest and posttest of the Creative Problem Solving tasks to determine whether improvement had taken place as a result of the intervention sessions.

Sample

Students enrolled in the undergraduate level educational psychology class, at a university in the southwest were recruited to participate in this study. Recruitment of participants was done by visiting the classes and providing a brief overview of the

purpose and procedures of the study. As is customary in the Educational Psychology department at this university, students who participated were awarded partial credit for the course. Students were informed of the places, dates, times, and amount of personal time required as participants via e-mail after they had signed up to participate and provided contact information to the researcher. All students were randomly assigned to a group and a scheduled time to attend the intervention. Some students could not participate at the originally assigned time and were randomly re-assigned to another time. Randomization was conducted using a table of random numbers.

There were a total of 74 participants, 67 females and 7 males, in the study. Ages of the participants ranged from 19 to 43 years, with the majority (66%) being either 20 or 21 years old. There were 65 Caucasians, four African-Americans, one Hispanic, three Native Americans and one bi-racial student. Self-reported ACT scores ranged from 11 to 34. There were 23 sophomores, 38 juniors, and 13 seniors participating in the study. The majority (26) of the participants majored in elementary education. Of the remaining participants, 16 majored in secondary language arts, six majored in secondary mathematics, six majored in secondary social studies, five majored in early childhood education, five in special education, four majored in secondary science, four majored in music education, and two majored in Spanish or European history. A complete breakdown of demographics by age, ethnicity, and major is located in Appendix A.

Instruments

All participants gave permission for their scores on the first exam of the educational psychology course to be used in the study. All participants completed an online pretest and posttest of classroom management knowledge. Additionally, during

their treatment session participants completed (1) a measure of fluency, the *Consequences Measure* (Christensen, P. R., Merrifield, P. R., & Guilford, J. P., 1953; Merrifield, Guilford, Christensen, & Frick, 1962), (2) a pretest and posttest creative problem solving task, (3) a posttest demographics sheet which included a self-report of the college entrance exam score of the participant, and (4) a posttest questionnaire measuring perceived value of creative problem solving training.

Course Exam #1. The first exam of the educational psychology course in which the participants were enrolled assessed understanding of the implications of cognitive theories for explaining how learning occurs. The four instructors used the same learning objectives and goals for teaching the course material and assessment. The exam was similar to the exams used in the course for several years. The data received from each instructor consisted of a percentage grade for each participant. The score on this exam was intended for use as a covariate to control for domain-specific ability in educational psychology; however, it was uncorrelated with any of the five components of creative problem solving used as dependent variables in the study and was not used as a covariate.

Online Pretest and Posttest of Classroom Management Knowledge. All students enrolled in the educational psychology class took an online pretest and posttest of classroom management knowledge. The pretest was given before the first day of instruction in classroom management and the posttest was given within one week after completing instruction in classroom management. Both of the online quizzes consisted of 15 multiple choice items and were designed based on the instructional objectives covered in this unit. On the posttest, only names or other irrelevant information had been changed from the pretest. The computer generated a randomization of response choices for each

item for each student on each quiz. Students were allowed 60 minutes to complete the quiz and received no feedback except their scores. Students were allowed only one attempt to complete the quiz. Data gathered for the study were the number of correct responses. A copy of the each quiz is located in Appendix B. These quiz scores were used as a check on the effectiveness of the classroom management instruction - did students' classroom management knowledge improve as a result of instruction?

Consequences Measure (Entering Fluency Measure). The *Consequences* (Merrifield, Guilford, Christensen, & Frick, 1962) measure was used to evaluate each participant's entering level of fluent thinking. Fluent thinking is the ability to generate as many ideas as possible from one cue or prompt (Cropley, 2001; Kaufman, Plucker, & Bear, 2005). Fluent thinking has been identified as a cognitive process necessary for successful creative problem solving (Mumford, Baughman,& Sager,2003; Parnes, 1961; Patterson & Zibarras, 2009; Runco, 1994; Schraw, Dunkle, &Bendixen, 1995).The *Consequences* measure was designed to measure fluent thinking by presenting five hypothetical situations. This measure has been shown to produce reliability coefficients above .70 while evidencing good validity as a marker of fluency (Merrifield, Guilford, Christensen, & Frick, 1962; Vincent, Decker, & Mumford, 2002). Each hypothetical situation was followed with a list of responses to serve as cues for generating more responses. Participants were given two minutes to generate as many ideas as possible for each question. Scoring of the measure required eliminating any responses that were duplicates of the sample response and then totaling the number of valid responses. A copy of the measure is located in Appendix B.

Self-Reported College Entrance Exam Score. Participants were asked to self-report their college entrance exam scores as a potential covariate for general academic aptitude. Most participants self-reported scores on the American College Testing (ACT). The ACT® test is a standardized and widely accepted college entrance test whose scores reflect a high school student's general educational development and ability to complete college-level work. Although self-reported ACT scores are not ideal, (e.g., Cole & Gonyea (2009) suggested that students tended to self-report higher ACT scores with, at best, 92% accuracy; although students who self-reported ACT scores were more accurate ($F= 18.31$, $p= .001$) than students who self-report SAT scores) they were the best available alternative. As Cole and Gonyea (2009) suggested, I was cautious when using ACT scores as a covariate.

Perceived Value of Creative Problem Solving. As a test of the possibility that creative problem solving instruction may have produced changes in participants' valuing of creative problem solving, but not their knowledge of creative problem solving, a measure of *perceived value of creative problem solving* was created for this study. Three statements were generated to reflect the participants' perception of the value of creative problem solving training. The first statement was "I believe a creative problem solving process would be valuable for solving classroom management problems." The second statement was "I believe I could solve classroom management problems better if I used a creative problem solving process. The third statement was "My solutions to classroom management problems would be improved if I used a creative problem solving process." Participants completed this measure after completing the *creative problem solving* posttest.

Creative Problem Solving Tasks. Two Creative Problem Solving tasks were created as the pretest and posttest of the creative problem solving intervention. The directions for each task were:

> *Read the scenario below. Give me your best solution to the problem. Be comprehensive in your thinking and in your description of the solution*.

Each of the two tasks was designed as a realistic classroom management problem. One task explicitly identified the classroom management problem as a student who repeatedly interrupted others and often answered questions inappropriately. Indications of involving parents and classmates were included in the scenario as cues for possible support for the teacher in dealing with the problem. The child in the scenarios was described as "energetic, smart, and well-liked" fourth-grader as a prompt for personality characteristics. Indications of his ability to complete his work independently were added to prompt the participants to think of his intellectual abilities. The scenario ended with information that various reprimands, punishments, and individualized discussions with the teacher, all classroom management techniques that had been taught in the classroom management unit of the course in which they were currently enrolled, had not worked. The final statement indicated the teacher needed a "creative way" to modify the behavior. This was the only prompt for a creative response that was given to the participants.

The other task was very similar in the information cues. The realistic scenario was based on a seventh grade female that frequently did not turn in her homework on time. The scenario included information describing the student as being well-liked by teachers and peers, and a brief description of her closest friend. These served as a prompt for the participants to think about the student's support system. A brief summary of her abilities

and her personality were included as cues to consider her personality characteristics and intellectual level. The scenario ended with the teacher's actions and interactions with the student. The final statement indicated the teacher needed new ideas to modify the behavior. This was the only indication of wanting a creative response that was given to the participants.

The tasks were counter-balanced for the study for all groups of the participants. Direct instructions from me before doing the task were limited to the following script: "Take out the [first or second] creative problem solving task and close your folder." I waited for all participants to complete this act and then continued with "This is not a timed test. I need you to read the directions and the scenario. Take your time to answer. You may use the front and back to write your answers. If you happen to think of more than one idea, please indicate which is your best idea with a star at the beginning of the idea. Does anyone have any questions? " I waited each time to answer any questions. There were no questions by any of the participants for either task in either group. Then I stated, "You may begin." All participants were done within 15 minutes for each scenario. When the participants completed his or her response to either task, most sat quietly and waited. A few students seemed to get bored and drew pictures on the inside of his or her folder. Occasionally, a participant would read what he or she had written and add in a few words. When we scored these, we noticed some had added words to clarify or make grammatical corrections; however, none of what was added seemed to be changes or additions to an idea. A copy of the Creative Problem Solving Tasks is located in Appendix B.

Scoring of the Creative Problem Solving Task. The two creative problem solving tasks were scored based on five criteria for each task; originality, usefulness, elaboration, and application of creative problem solving and classroom management training. The first three components are based on the definition of creativity given earlier in this paper and are commonly used components in creativity studies. The last two components, application of creative problem solving and application of classroom management, were to determine if participants could demonstrate applying the information taught in either the creative problem solving intervention or the classroom management training, respectively. Each component was scored on a five point scale. Each protocol was scored according to the scoring template described below and shown in Appendix B; thus creating five individual scores (originality, usefulness, elaboration, and two application scores) on each protocol.

The originality score was generated on a 5-point continuum with five points being the most creative. The scale was derived from research of previous scales and revised by the three raters who served as the scoring team. This was based on the experience of the raters as teachers and also after reading several of the responses. I had created a training protocol that included what I thought were convergent and divergent answers based on my personal experiences of working with students at this level and also my experiences of using a similar instrument previously as a class activity. The team of raters chose to make some minor revisions as explained in the section about the training.

The Usefulness score was based on a five-point scale. The component was used to assess how relevant the solution was to the problem in providing practical and ethical solutions that a teacher could presumably use in a classroom. The lowest score of one

reflected a lack of a solution. The middle score of three reflected a solution that had minimum relevance to the stated problem. A top score of five reflected the solution was practical and ethical, and indicated that it was not only useable, but might be used as a example for teaching what a useful solution might look like to students in a teacher education program.

The Elaboration score was assessed on a five-point scale. The component was designed to assess how well the student explained the solution. A low score indicted there was not enough information for a teacher to be able to use the solution. The middle score of three reflected there was enough detail for the idea to be individualized or revised and used by a teacher in a classroom. A top score of five indicated the solution was explicit enough for a teacher to carry out the plan as written.

The Application of Creative Problem Solving score was designed to see if the application of the new knowledge was evident in the responses. According to Bloom's Taxonomy, students who had grasped the concepts at higher levels of learning would be able to synthesize and apply knowledge from the training to the scenarios. We expected some application knowledge of what had been taught and practiced to be evident. A low score of one or two indicated no or very little application of the new knowledge. A score of three or four indicated there was some transfer of knowledge by using terms or concepts learned in the interventions. The highest score of five was reflective of explicit and appropriate use of concepts and terms in the responses; specifically, the responses at this level contained either the diagram or at least mentioned the various ways to think about several possible influences on the problem or the solution in the response.

The Application of Classroom Management score was designed to see if transfer of classroom management knowledge could be found in the responses. According to cognitive theories of learning, participants who had high levels of domain-specific knowledge should be able to synthesize and apply knowledge from the classroom management training to the scenarios (Anderson, 2005; Anderson & Schunn, 2000; Klein, 1996; Marchant, Robinson, Anderson, & Schadewald, 1991; Novick, 1988; Silver & Bennett, 2008). We expected some level of transfer of knowledge to be indicated. A low score of one or two reflected no application of classroom management principles. A middle score of three or four indicated there was some transfer of knowledge indicated by the use of terms or concepts learned in the interventions. The highest score of five was reflective of explicit and appropriate use of classroom management concepts and terms in the responses, specifically the participant explicitly referred to theories or strategies appropriately in the response.

Scoring of the Creative Problem Solving Tasks was based on the consensus of three "expert raters." I was one of the "experts" and two graduate students who had completed courses on the basic theories and principles taught in the classroom management unit were the other two. I trained the two graduate students in the basic principles of the creative problem solving intervention. Both raters were shown the creative problem solving strategies and tasks used in the intervention. We met on four different occasions. The focus of the first meeting was three-fold. First, to be sure all three raters were comfortable with the theoretical foundations of the study. Second, to be sure all three raters understood the theories and principles of the creative problem solving model chosen for the intervention, and third, to be sure all raters understood the theories

and principles of classroom management that the participants would learn. During the first meeting we also discussed the scoring rubric and graded copies of response forms as a group until each rater was relatively comfortable to score several response sheets independently before the next meeting.

During the second meeting the raters compared scores and discussed problems with the scoring system. It was agreed that some components were not always well-defined and some of the responses could not be scored because they did not really align with the possible scores. These concerns were addressed and the operational definition of each component was clarified. We also realized that the scoring system was missing a valuable piece; an actual score for application. It was agreed that an application score would provide a direct, clear association of the responses to the research questions. A revised scoring system was completed and we scored three (5% of available protocols) together to be sure we were in agreement. As part of the meeting, each rater scored five responses individually and we compared our scores. Due to time and other obligations of the raters, we agreed to meet two weeks later to compare scores on an additional set of protocols. Copies of all response sheets were made for each rater. The two assistant raters took 25% from the available response sheets. Each rater scored her stack of response sheets individually after the meeting. In our third meeting, we discussed any scoring concerns or difficulties before comparing scores. We found that agreement among raters was relatively consistent at 85% of similar scores; the scores that were not in agreement were usually within one point; which meant the disagreement only involved one component, although the component varied occasionally. At the end of the meeting raters chose a final group of response sheets to score. At a fourth and final meeting, the

raters returned the scored response sheets. During this final meeting, it was agreed that, although a slightly subjective process, the scoring should be relatively consistent and all raters were confident of their scores.

This process is a variation of the Consensual Assessment Technique (CAT) described by Amabile (1982, 1996) and Kauffman, Plucker, and Bear (2005) in which experts are asked to rate the creativity of various types of completed products. Interrater agreement among the three raters for scoring the two forms of the Creative Problem Solving Task was calculated using the Fleiss Kappa formula. Inter-rater agreement was found to be $\kappa = .95$, which is considered to be "almost perfect" (Fleiss & Cohen, 1973). The Fleiss Kappa is used for assessing the reliability of two or more raters when assigning categorical ratings to a number of items or when classifying items $\left(\kappa = \frac{\overline{P} - \overline{P}_e}{1 - \overline{P}_e}\right)$. Kappa indicates the degree of agreement achieved that is greater than chance agreement.

Interventions

Design of the intervention sessions was based on previous empirical studies indicating that creative problem solving strategies could be taught, and on my previous experiences teaching both interventions (Basadur, Graen, & Green, 1982; Bransford, 1993; Chi et al., 1988; Harrington et al., 1996; Mumford, Baughan, & Sager, 2003; Schraw et al., 1995; Shin, et al., 2003; Vincent, Decker, & Mumford, 2002; Wang & Horng, 2002; Weisberg, 2006). Puccio, Firestien, and Masucci (2006) reported a meta-analysis of effective creative problem solving training designs of a few hours to weeks. Design of the instruction for each intervention was based on four primary considerations: (1) length of time of intervention sessions (2) information to be provided (3) availability

of resources and (4) time constraints to complete the first two groups before classroom management training began in the course. It was a primary concern that both interventions be as parallel as possible in terms of delivery of instruction, sequence of content, and length of time. Design, adaptation and adoption of evaluations and the order of all measures were also addressed during this stage of instructional design.

Development of the interventions consisted of creating appropriate PowerPoint slides for the topic based on the learning objectives and learner abilities. Development of the assessments began with a search for an appropriate measure that could be adopted for the study.

Creative Problem Solving Treatment. The training in creative problem solving was an interactive session lasting about 15 -20 minutes. The intervention consisted of an overview of the terms used in creative problem solving, a realistic problem that students worked through as each phase of the fishbone strategy was discussed and a brief summary of what was taught. Participants received a copy of the scenario used as a teaching aide, and a blank template of the fishbone diagram to use during the creative problem-solving lecture. During the session, participants actively engaged in the training by working through the task using the Osborne-Parnes Creative Problem Solving technique, including the fishbone strategies. After I taught the terminology related to creative problem solving, I explained the basic Osborn-Parnes Model. Then I gave each participant a copy of a scenario about a college student organization unable to retain membership. The problem was that the student organization might be disbanded if student membership continued to drop and the members did not want that to happen. I read the scenario aloud. I guided participants in a group discussion of practice for each

step of the model. For the first phase of the model, identifying the problem, I asked the participants, "What is the goal or challenge of this problem?" At least one or more participants in each session responded that the goal was to keep the organization active; often there were other goals or less complete goals suggested. Naturally, the participants worded the response differently, but each group had the same general response by the end of that part of the discussion.

After completing the first step, I asked them to find all the relevant facts in the scenario. Each group found most of the facts; some groups found more facts than other groups. I did not push the groups to find all the facts at that time, but did explicitly state that more facts could be found and they could continue to examine the scenario again as we worked through the process. This helped to reiterate that the Osborn-Parnes Creative Problem Solving Model is not a hierarchical or linear process.

As I guided them into the problem finding substage, I asked the participants to go back and look at the original goal we had identified and asked if this was the problem that needed to be our focus- or should we clarify the problem. Some of the groups were satisfied with the goal as stated and other groups that had generated a more general or inaccurate wording of the goal understood the original goal needed to be clarified. As necessary, I led the group to clarify so that all groups had identified needing to increase membership as the main goal; although wording varied among and between groups.

I began the second phase, Generating Ideas, by reminding them that we needed to generate ideas to solve this problem. At this point I passed out blank copies of a fishbone diagram and explained we would refer to each slanted line as a "bone." I also explained that we would be adding smaller "bones" or lines to each of the large bones as we

thought of specific ideas for each category. I told the participants to list the appropriate headings for each bone on their diagram as people, behaviors, resources, equipment, and environment. We discussed each category individually and the participants offered suggestions as to what should be listed on the bone. For example, the bone for people included ideas such as the student body, the dean, faculty sponsor, officers of the organization, and other ideas such as guest speakers, potential students, and a new faculty sponsor, were suggested by the group. There was a lot of variation in the items suggested during this stage. I did not push for consistency of terms among groups, but did offer suggestions to get the groups started, if needed.

After the groups had exhausted their ideas or we were running short on time, I explained the next step would be Solution Finding and this was would be done as a 2-step process, First the participants were asked to circle the ideas they thought were the best ideas. I encouraged each participant to make his or her own choices. Then I had the participants rank the ideas they had chosen in order. We discussed some of the ideas each person had chosen and how they had ranked them.

As the final step, I showed the slide with the quote from Parnes (1961) stating that no problem is solved until a solution is implemented. I explained to the participants that if this had been a real situation, they would create a unique solution based on their best idea. I explicitly explained the solution should be detailed and include: who could or would be involved, the detailed plan of action, including when each part of the plan was to be done, and how to check to be sure the plan was working. I explained this step could not be completed and used lack of information relevant to the ideas that participants had shared as reasons for not being able to complete the final step. For example, many had

suggested throwing parties that focused on membership drives, making flyers or creating mass e-mails; but these ideas could not be completed during the session because the participants would need additional information of school policy for such ideas. An outline of the lecture and questions asked in relation to each phase of the model during the interactive part of the scenario are listed Table 2. A copy of the information used with the experimental groups is located in the Appendix C.

Table 2

Outline of Creative Problem Solving Training

I. Overview of Training

II. Terminology

A. Problem

1. Two Criteria

i. Difference between current state and desired state

ii. Solution must have social, cultural or intellectual value

2. Runs on a continuum of ill-defined to well-defined

i. Well-defined

a. Problem is stated and usually has a pre-determined solution

b. Often can be solved with algorithms

ii. Ill-defined

a. Problem not easily identified

b. May have more than one correct solution

Table 2 (continues)

c. Usually solved based on expertise of domain

3. Complexity and stability of problem vary based on domain

B. Solution

1. Man-made resolution to a problem

C. Problem solving

1. A goal-directed sequence of cognitive operations

2. The process varies according to complexity, context, structure, and type of problem

3. Creative problem solving

i. Process that uses convergent and divergent thinking to solve a problem

III. Overview of Osborn- Parnes Creative Problem Solving Model

A. Three Components or stages with six substages

1. Understanding the problem

i. Mess Finding

ii. Fact finding

iii. Problem finding

2. Generating Ideas

i. Convergent and divergent ideas

3. Preparing for action

i. Solution finding

ii. Acceptance finding

Table 2 (continues)

IV. Interactive Practice

A. Give participants a copy of scenario and blank fishbone diagram

B. Interactive discussion of each phase and encourage responses

1. Understanding the problem

a. Mess finding: participants identify the challenge

b Fact finding: participants find relevant facts

c. Problem finding: participants identify a specific problem

2. Generating ideas

a. Participants respond with ideas to complete fishbone

i. Use People-Behavior-Resource-Equipment-Environment as large bones

ii. Participants generate ideas – add smaller bones as appropriately

3. Plan for action

a. Solution finding

i. Participants circle ideas and rank them

ii. Decide on the best idea

b. Acceptance finding

i. Design intervention or solution based on answering:

Who can/should be involved

Table 2 (continues)

	What action or behaviors should take place
	When should it happen
	Where should the solution take place
	How can you know it worked
V. Summary	
A.	Has been proven as reliable process in industry, organizational and educational settings
B.	Is flexible enough to solve problems in any personal or professional environments

Creativity Control Treatment. Participants in the control group were presented with a 15-20 minute lecture providing a brief definition of creativity, an explanation of terms and cognitive processing strategies related to creativity and suggestions from Cropley (2003) for encouraging creativity in the classroom. After the lecture, questions about the information covered were allowed. All questions were answered to the participant's satisfaction. An outline of the training session is listed in Table 3.

Table 3

Outline of Creativity Control Training: Creativity in the Classroom

I. Overview of Training Session

II. Clarifying the definition of Creativity

A. The ability to create something novel (unique) and effective (useful).

III. Characteristics of the creative individual

A. Everyone has some creative characteristics

B. Basic characteristics:

1. Fluency
2. Flexibility
3. Originality
4. Risk-taking
5. Curiosity
6. Inner directedness

IV. Cognitive Processes

A. Divergent Thinking

B. Convergent Thinking

C. Critical Thinking Skills

D. Analytical Processing

E. Analogical Reasoning

Table 3 (continues)

V. Costs v. Benefits

A. The costs

1. Time

i. To explain the basics

ii. To allow children to do their own work in their own way, to let them discover the answer instead of telling them the answer

iii. Less than two minutes to say "there is no right or wrong answer" for this activity

iv. To respond positively to all honest efforts

2. Tolerance

i. For a noisier, busier classroom

ii. For many new ideas

iii. To learn from your students

B. Benefits

1. Children who are successful students

i. Develop autonomy

ii. Develop a love for learning

iii. Enjoy coming to class

iv. Are more self-confident

v. Think for themselves

Table 3 (continues)

2. Less Stress during testing
3. Higher scores on standardized testing
4. A happier, environment on a daily basis, children love your classroom

VI. Creating a Creative Classroom

A. Encourage students to learn independently
B. Have a co-operative, socially integrative style of teaching
C. Do not neglect mastery of factual knowledge
D. Tolerate sensible or bold errors
E. Promote self-evaluation
F. Take questions seriously
G. Offer opportunities to work with varied materials under different conditions
H. Help students learn to cope with frustration and failure
I. Reward courage as much as possible

Classroom Management Treatment and Control. The classroom management treatment was the classroom management section of the Educational Psychology course in which the participants were enrolled. This section of the course has proven to be effectively taught over the years. During the course, students engaged in various lectures, class discussion, and activities aimed at teaching established theories and principles that are often considered best practices for classroom management, including proactive and reactive teacher behaviors for all aspects of classroom management. A chronological table of the topics covered in the classroom management course is located in Table 4.

Table 4

Outline of Classroom Management Unit

I. Characteristics of effective teachers/managers

- A. Teacher As Authority Figure
- B. Teacher As Socialization Agent
  - 1. Socialization Demands at different grade levels
  - 2. Characteristics of Effective Socializers

II. Preventing Classroom Management Problems

- A. Planning the Beginning of The Year
  - 1. Rules and Procedures
  - 2. Planning Consequences
  - 3. First Day of Class
- B. Prevention of Problems Through Effective Instruction
- C. Kounin's Management Skills

III. Short-term (Immediate) Corrective Measures

- A. Short-Term Strategies: Fleeting Minor Misbehavior
- B. Short-Term Strategies: Sustained Minor Misbehavior
- C. Short-Term Strategies: Disruptive Behavior
- D. Short-Term Strategies: Punishment

IV. Long-Term Strategies for Correcting Misbehavior

- A. Behavioral views: Operant Conditioning and Applied behavior analysis
- B. Gordon's Teacher Effectiveness Training/Need for communication.

All instructors who taught the course had taught college level courses for at least three years and had taught this particular course at least once prior to the semester of the study. All instructors and professors of this course used the same teaching objectives and same activities for this section; thus the students received the same information. Although all participants received the classroom management section of the course, 30 students met for the creative problem solving treatment the week before the classroom management training began. These students formed the classroom management control condition. Half of this group received the Creative Problem Solving training (CPS only) and the other half received the Creativity Control training (no training control). All the remaining participants completed the classroom management section of the course prior to receiving their Creative Problem Solving training (CPS + CMT) or Creativity Control training (CMT only).

Procedures of Study

Recruitment. Recruitment occurred as a one-time visit to each of the three sections of the class. The visit occurred three to five days before the start of the study, depending on the meeting day and time of the section. I informed students of the nature of the study, gave a brief description of the activities involved, the potential benefits of participation, and the reason for the study. I gave time for any questions before explaining to the participants that if they were interested in participating, I needed to be able to contact them individually to set up a time and place for participation. Participants were then asked to sign a list if they wanted to participate so they could be notified of a time and place for the study. Recruiting was done in three of the four classes by the

primary researcher. My advising professor followed the same procedure and recruited in my section at the beginning of my class to avoid coercion. The actual recruiting process took less than five minutes in each class.

Intervention Order of Events. Each intervention session followed the same structural design. First students completed the Informed Consent Form that had been approved by the IRB. Second, the participants were given a folder with all necessary instruments and training materials. Third a brief explanation of what would be done in the session was given with time allowed for any questions. Fourth the participants were asked to place the signed Informed Consent Form in the folder and remove the Consequences instrument. The instructions were read and questions about the instrument were encouraged. No questions were asked by any participant in any group. The Consequences instrument was administered according to directions with each question being timed at exactly two minutes by a kitchen timer. Fifth, the participants placed the Consequence measure back into the folder and removed the first creative problem solving task. Instructions were read aloud and questions were encouraged before starting. After all participants had completed the task, participants were told to place the task in the folder and close the folder. Depending on the group, the participants were administered either the Creative Problem Solving treatment or the Creativity in the Classroom control treatment. Sixth, the students were asked to complete the second creative problem solving task. After participants had completed the task, all students were directed to place the creative problem solving task back in the folder and remove the demographics sheet. Participants were asked to complete the demographics sheet and then sit quietly for further instructions. After all participants had completed the demographics sheet,

participants were thanked for their time and quickly debriefed on the purpose of the study and were given a chance to ask any further questions about the activities or the study in general.

Chapter III

Results

This study was a 2 X 2 factorial designed to examine the effects of teaching creative problem solving and classroom management on participants' creative problem solving ability for classroom management problems. The three research questions of the study were (1) Does training in creative problem solving improve posttest creative problem solving performance? (2) Does training in classroom management improve posttest creative problem solving performance? (3) Does training in both creative problem solving and classroom management improve posttest creative problem solving performance beyond that of either creative problem solving or classroom management alone? An alternative hypothesis to examine the influence of the perceived value of creative problem solving training on the outcome of creative problem solving training was also tested. To address the three research questions and the alternative hypothesis, a MANOVA and MANCOVA were conducted. All data analysis was done using Statistical Package for Social Science (SPSS) Graduate Pack 16.0 or a later version

Data Preparation

There were a total of 74 participants after one was dropped for not signing an Informed Consent Form for the study. All participants completed the profile demographic form, with the exception of five participants who either could not remember their ACT scores or reported an SAT score. Due to differences in the composition of the two tests, SAT scores cannot be accurately converted to ACT scores (Cole & Gonyea, 2009). Participants who reported SAT scores were not included in the ACT profile but were included in all other profiling and statistical analyses. Two students did not take the

pretest online classroom management quiz and one of those students did not respond to the online posttest classroom management quiz. Those participants were dropped from the data analysis of pretest and posttest of the classroom management quiz. Gain scores were calculated for each of the components of the Creativity Problem Solving Tasks by subtracting the scores of the pretest from the scores of the posttest for each participant. Gain scores were used to answer the research questions.

Preliminary Data Analysis

Several analyses were necessary before addressing the research questions. First, the reliability of instruments used in the study was determined when possible. Most instruments were found to be acceptable; details for each instrument will be discussed in the next section. Second, correlations were examined to identify whether the covariates and the five gain scores calculated between pretest and posttest of the Creativity Problem Solving Tasks were related. Third, a paired-samples t-test of the pretest and posttest of the classroom management quizzes was conducted to determine whether participants learned the classroom management content taught in the course. Fourth, a MANOVA using the gain scores for each component was conducted. Finally, a Multivariate Analysis of Covariance (MANCOVA) was conducted.

Reliability

Consequences measure. The Cronbach alpha reliability of the Consequences measure for this study was found to be .82. Deleting any item would have reduced the alpha.

Value of Creative Problem Solving. The Cronbach alpha reliability of the Value of Creative Problem Solving statements was found to be .74. Deleting any items would have reduced the alpha.

Interrater Reliability of Creative Problem Solving Tasks. The Creative Problem Solving instrument, given as both a pretest and posttest, consisted of five components. Scoring of responses was conducted using a revision of the consensual assessment technique in which two or more expert raters were used to assess the responses as described in the previous section (Amabile, 1982; Kauffman, Plucker, & Bear, 2005). Fleiss Kappa was used, $\left(\kappa = \frac{\overline{P} - \overline{P}_e}{1 - \overline{P}_e}\right)$. The formula is a statistical measure designed to assess the degree of agreement above that of chance for more than two raters. Fleiss' kappa is a six-step process in which the proportions of all ratings are compared to the calculation of a chance agreement for the situation. Calculations were completed using an Excel template. Interrater reliability was found to be $\kappa = .95$, which is considered to be "almost perfect" (Fleiss & Cohen, 1973; Landis and Koch, 1977).

Classroom Management Quizzes. There was a pretest and a posttest of the classroom management quiz given online. Each form had 15 items. Alpha for the pretest was originally calculated at .27. Eliminating one item on the pretest raised alpha to .42. Alpha for the posttest was calculated at .52. Item 12 was automatically deleted by the SPSS program on both forms due to zero variance of the item.

ACT scores. Participants' self-reported American College Test (ACT) scores were used as a measure of academic aptitude. A single score was reported by 69 of the participants; therefore reliability could not be calculated.

Exam 1. The class instructor gave each exam and participants granted permission for me to access the score, but not individual responses. This was a single score; thus, reliability could not be calculated.

Descriptive Statistics

Descriptive Statistics. Mean scores and standard deviations for each measure are listed in Table 5

Table 5

Means and Standard Deviations

Instruments	M	SD	Min	Max
Creative Problem Solving Tasks				
Pretest scores				
Originality	2.07	1.31	1.00	5.00
Usefulness	3.95	1.36	1.00	5.00
Elaboration	2.62	1.31	1.00	5.00
Application of Creative Problem Solving	1.12	0.46	1.00	5.00
Application of Classroom Management	1.81	1.04	1.00	5.00
Posttest scores				
Originality	2.12	1.39	1.00	5.00
Usefulness	3.46	1.56	1.00	5.00
Elaboration	2.60	1.23	1.00	5.00
Application of Creative Problem Solving	1.41	0.99	1.00	5.00
Application of Classroom Management	1.77	1.05	1.00	5.00

Table 5 (continues)

Classroom Management Quiz				
Pretest scores	10.36	1.74	5.00	13.00
Posttest scores	11.45	2.06	5.00	15.00
Covariates				
ACT scores	24.72	4.06	11.00	34.00
Exam 1	39.98	3.23	30.00	45.00
Fluency	31.34	7.84	14.00	50.00

Analysis of the Covariates and Value Screening for Creative Problem Solving Task

A correlation analysis was done to determine which covariates, if any, correlated with which components of the Creative Problem Solving Tasks. There was a significant relationship (r= .25) between ACT scores and Originality on the pretest and a significant relationship (r= -.29) between ACT scores and Application of Classroom Management on the posttest. There was a significant relationship (r= .29) between total fluency scores as measured by the *Consequences* measure and the Application of Classroom Management factor on the posttest. There were no relationships between the first course exam scores and any of the Creative Problem Solving tasks components. There were no relationships among the Value of Creative Problem Solving Training and any of the components the Creative Problem Solving Tasks. As a result, only ACT scores and the *Consequences* measure were used as covariates in subsequent analyses, primarily to see if they influenced differences on Originality and Application of Classroom Management.

Manipulation Fidelity of Interventions

Creative Problem Solving. All participants were randomly assigned to either a control treatment or an experimental treatment. Thirty-eight participated in the control treatment and 36 participated in the experimental treatment. All creative problem solving and control treatments were conducted by the same researcher using the same procedure and one of two PowerPoint presentations; one for the creative problem solving training and one for the control training sessions. An analysis of the posttest results indicated 14% of the students who had received the creative problem solving training explicitly used the fishbone diagram taught to create their response and another 25% correctly used terms that were taught in the training in their responses. No one in the control group did these things. Analyses of the Creative Problem Solving gain scores indicated that participants in the CPS groups showed greater gains on Application of Creative Problem Solving than those in the control group, indicating that the creative problem solving training was effective. Details of the results of the MANOVA and MANCOVA are explained more fully in the sections answering the research questions.

Classroom Management. The classroom management content was taught by one of four instructors using the same content and the same learning objectives. All participants received classroom management training. Thirty participants received the classroom management training after participating in the creative problem solving training session and 44 participants received the classroom management training before participating in the creative problem solving training. The PowerPoint slides and activities used by the course instructors were similar. All instruction in classroom management began the same week and ended the same week for all four sections. All

participants except two, as previously discussed, completed the classroom management online quiz prior to the first class of the classroom management training. The online posttest was taken by all participants except one, as previously discussed, within five days after the last day of classroom management instruction in each class. A checklist comparing content and learning objectives covered in each class indicated all material was covered in the same order. A paired-sample t-test of the pretest and posttest means was also used to confirm the same content was learned. The t-test indicated that there was a significant difference ($t_{(1, 73)} = -3.92$, $p = .000$) with the mean scores on the posttest being significantly higher than those on the pretest.

Analyses of Research Questions

Three research questions were generated. Each question was answered using either MANOVA or MANCOVA on the gain scores for each component of the Creative Problem Solving task. See Table 6 for gains scores of each group.

Question 1. The first research question was "Does training in creative problem solving improve posttest creative problem solving performance?" Based on the MANOVA, there was a significant multivariate difference ($F= 2.58$, $p = .034$) between groups who had creative problem solving training and those who did not. Further analysis of the Univariate between group tests indicated a significant difference for gain scores on Elaboration (6.50, $p= .013$) and Application of Creative Problem Solving ($F = 7.59$, $p= .007$). Interestingly, although the Application of Creative Problem Solving scores showed a significant gain for those in the creative problem solving training group, scores on Elaboration showed a significant decline.

Table 6

Mean Gain Scores by Treatment Condition

Creative Problem Solving Component	Treatment Condition CPS	CM	M	SD
Originality				
	No CPS	No CMT	.60	1.99
		CMT	.13	1.87
		Total	.32	1.90
	CPS	No CMT	-.07	1.67
		CMT	-.19	1.44
		Total	.14	1.51
	Total	No CMT	.27	1.84
		CMT	-.02	1.66
Usefulness				
	No CPS	No CMT	-.13	2.10
		CMT	-.26	2.28
		Total	-.21	2.18
	CPS	No CMT	-1.20	1.74
		CMT	-.14	1.74
		Total	- .58	1.79
	Total	NO CMT	-.67	1.97
		CMT	-.21	2.02

Table 6 (continues)

Creative Problem Solving Component	Treatment Condition CPS	CM	M	SD
Elaboration				
	No CPS	No CMT	.40	1.59
		CMT	.52	1.27
		Total	.47	1.39
	CPS	No CMT	-.73	1.98
		CMT	-.19	1.36
		Total	-.42	1.65
	Total	NO CMT	-.17	1.86
		CMT	.18	1.35
Application to Creative Problem Solving				
	No CPS	No CMT	.07	.26
		CMT	-.04	.21
		Total	.00	.23
	CPS	No CMT	.40	1.06
		CMT	.76	1.34
		Total	.61	1.23
	Total	No CMT	.23	.77
		CMT	.34	1.01
Application to Classroom Management				
	No CPS	No CMT	.40	.99
		CMT	- .39	1.08
		Total	- .08	1.10
	CPS	No CMT	-.07	1.28
		CMT	.05	1.40
		Total	.00	1.33
	Total	No CMT	.17	1.15
		CMT	-.18	1.24

Table 7 presents the result of the Univariate Tests of gains scores for those receiving creative problem solving training and those who did not.

Table 7

Univariate Analysis of Gain Scores by CPS Components

	F	*p*	Partial Eta Squared	Observed Power
CPS Components				
Originality	1.43	.235	.02	.22
Usefulness	1.01	.319	.01	.17
Elaboration	6.50	.013	.09	.71
Application of CPS	7.59	.007	.10	.78
Application of CM	.00	.961	.00	.05

As I described previously, there was a relationship between Application of Classroom Management and two covariates (ACT and fluency scores); therefore, I ran MANCOVA between the two groups and the Application of Classroom Management with the covariates to identify the influences of the covariates on this component. The results of the MANCOVA were similar to the MANOVA. Based on the Multivariate test, there was a significant difference ($F(1, 68) = 2.56$, $p = .037$) between scores for those receiving creative problem solving training and those in the control group when controlling for ACT and fluency scores. Based on the Univariate tests, there was a significant difference ($F(1, 73) = 6.08$, $p = .016$) in scores for Elaboration and for

Application of Creative Problem Solving ($F(1.73) = 5.99$, $p = .017$) for those receiving creative problem solving training and those receiving the control training when controlling for both ACT and fluency scores. As in the previous MANOVA no differences were found for Application of Classroom Management despite the inclusion of the covariates.

Based on evidence in this study, the answer to the first research question is: there are indications that training in creative problem solving can improve posttest creative problem solving performance because the gain scores were higher on Application of Creative Problem Solving. In addition, there was an unanticipated significant negative gain score on Elaboration. There were no significant gains or losses on the other components. A more detailed explanation of these findings will be provided in the final chapter.

Question 2. The second research question was "Does training in classroom management improve posttest creative problem solving performance?" To answer this question I ran a MANOVA using the gain scores of the pretest and posttest scores of the Creative Problem solving tasks as the dependent variables. At the multivariate level there was no significant difference on scores between the classroom management training and control groups. Additionally, none of the univariate tests resulted in statistically significant differences either. I have listed the results of the Univariate Tests in Table 8.

Table 8

Univariate Analysis of Gain Scores by CM Training

CPS Components	F	*p*	Partial eta Squared	Observed power
Originality	.52	.474	.01	.11
Usefulness	1.00	.329	.01	.16
Elaboration	.84	.362	.01	.15
Application of CPS	.37	.544	.01	.09
Application of CM	1.42	.238	.01	.22

Additionally, I ran a MANCOVA using ACT and fluency scores as covariates. This also produced no significant differences between the classroom management treatment groups. Based on the findings of the MANOVA and MANCOVA in this study, the answer to the second research question is there is no indication that classroom management training improved creative problem solving performance.

Question 3. The third research question was, "Does training in both creative problem solving and classroom management improve posttest creative problem solving performance beyond that of either creative problem solving or classroom management alone?" To answer this question I ran a MANOVA using the gain scores of the pretest and posttest scores of the Creative Problem solving tasks as the dependent variable and examined the interaction of creative problem solving training and classroom management training. At the multivariate level there was no significant difference for the interaction,

also, none of the univariate interaction analyses were significant. I also ran a MANCOVA using ACT and fluency as covariates. Once again the interaction failed to produce either a significant multivariate effect or univariate effect. I have listed the results of the Univariate Tests in Table 9. Based on the findings of the MANOVA and MANCOVA in this study, the answer to the third research question is there is no indication that training in both creative problem solving and classroom management combined improved posttest creative problem solving performance."

Table 9

Univariate Analysis of Differences in Gain Scores by CPS and CM Training

	F	*p*	Partial Eta Squared	Observed Power
CPS Components				
Originality	.18	.474	.01	.11
Usefulness	1.59	.329	.01	.16
Elaboration	.843	.362	.01	.15
Application of CPS	.37	.544	.01	.09
Application of CM	1.42	.238	.02	.22

Perception of Value. It was suggested that perhaps participants who perceived value in learning the creative problem solving strategies might perform better on the tasks. To test this hypothesis, a linear regression for each creative problem-solving component was conducted using centered scores. The centered score for each component was calculated by subtracting the mean score of the perceived value scale from the total

perceived value for each participant. I multiplied the creative problem solving training dummy variable and centered score to create an "interaction dummy variable." The creative problem solving dummy variable, centered perceived valuing scores and the interaction variable were independent variables in the linear regression. The full model accounted for a significant amount of variance ($F(3, 70) = 3.58$, $p = .018$) in gain scores for Application of Creative Problem Solving; however, none of the individual predictors accounted for a significant amount of variance. Additionally, none of the other regression models for the remaining components of creative problem solving resulted in statistical significance. This indicates that the perception of valuing variable did not account for significant amount of variance in the components of creative problem solving gain scores.

Chapter IV
Discussion

This study was designed to examine the effects of teaching creative problem solving and classroom management for improving creative problem solving performance by preservice teachers to solve realistic classroom management situations. The study was a 2 X 2 factorial design. Three research questions were generated for the study: (1) Does training in creative problem solving improve posttest creative problem solving performance? (2) Does training in classroom management improve posttest creative problem solving performance? (3) Does training in both creative problem solving and classroom management improve posttest creative problem solving performance beyond that of either creative problem solving or classroom management alone? A MANOVA and MANCOVA each using the gains scores for the five components of the Creative Problem Solving tasks were used to address the three research questions. The results were basically the same for the MANOVA and the MANCOVA. The significant changes, when controlling for the covariates were still the increase in the Application of Creative Problem Solving and the decrease in the Elaboration components. Although there were increases between the pretest and posttest scores on the classroom management quizzes, there was no indication students could apply the information learned to realistic situations. There were no significant differences resulting from the interaction of the two types of training. Below is the discussion of the findings, limitations, implications, and suggestions for future studies.

Research Question 1

Does training in creative problem solving improve posttest creative problem solving performance? The MANOVA and MANCOVA indicated there were significant differences between those who had received creative problem solving training and those in the creativity training control group on the gain scores of Elaboration and Application of Creative Problem Solving. Gain scores on Application of Creative Problem Solving were significantly greater and gain scores on Elaboration were significantly lower dropped; yet the gain scores of the Originality, Usefulness, and Application of Classroom Management components did not differ significantly.

The increase in Application of Creative Problem Solving was the expected result. The increase indicates that participants used some of the creative problem strategies taught to help generate responses. As previously stated, 14% of the students who participated in the creative problem solving training explicitly used the fishbone diagram and another 25% of the participants correctly used terminology taught during the training. This is encouraging because it suggests that such brief training could be effectively incorporated into existing teacher education class, like our educational psychology class, and the training would have an impact on the way preservice teachers approach solving classroom management problems.

One reason for the increase of scores on the posttest of Application of Creative Problem Solving component can be explained by Anderson's Adaptive Control of Thought- Rational (ACT-R) theory. According to the theory, individuals often respond to problems with solutions based on what they can quickly recall, such as information that has been recently activated or has been deeply encoded, making it the easiest to retrieve.

The participants in this study were given an opportunity to practice the creative problem solving strategies during the training session, which helped to organize the information into what Anderson refers to as the appropriate modules and buffers of each domain. The information was easily retrievable for the participants because it had been the most recently practiced; thus it was the quickest to be brought back into the domain buffer. The participants were asked to complete the tasks while still sitting in the same room; therefore, the information was also easily recalled because the conditions were conducive to recall based on the environmental cues (Anderson, 1982; Taatgen, van Rijin, Anderson, 2007).

The decrease in posttest of Elaboration was a surprising result. Several things may have contributed to the decrease. Contributory influences may have been situations such as (1) the amount of time spent on the slide related to elaboration and the location of that information, (2) failure of participants to relate the instruction "be comprehensive" to the response, and (3) time constraints. Each of these influences may have led participants to provide only the general idea he or she generated and not elaborate as much as the expert raters were anticipating.

The Osburn-Parnes model explicitly places elaboration of an intervention as part of the final phase. In the training, elaboration of a solution was taught as a final substage of the last phase of the model. There was purposely little time spent on this slide so that participants would hopefully create unique and useful detailed solutions to the creative problem solving task by pulling from their own unique expertise. This did not happen and the participants stopped with less elaboration of the solution than was anticipated. On the other hand, elaboration was listed as one of four frequently assessed factors of creativity

on one slide early in the control training. Participants who had received the creativity control training may have picked up on the importance, however subtle, more so than those in the creative problem solving training in which elaboration was briefly discussed at the end of the training.

Another possible reason for the decrease may have been related to participants trying to create solutions to the scenarios that matched my expectations. Based on participant responses, it is logical to conclude participants were more concerned with using terminology or the information just presented than providing details. The directions included a statement that instructed the participants to be comprehensive; however, I am not sure that the participants really paid attention to that part of the instructions. It is possible for a college student to see a scenario, followed by blank lines to immediately begin creating a response with no more than a glance at the instructions.

A third reason for the decrease in posttest of elaboration scores may have been related to time constraints. There were indications of time constraints from many participants. Although they had been told during recruitment the training session would last approximately one-hour; many participants asked how long the training session would last as they entered the room. During the session, I occasionally saw participants stop working to look around; and if most participants were finished, the participant would write quickly. I inferred from the facial expressions and body language, they wanted to be sure they were not the only person still working. Based on the verbal and behavioral expressions of the participants, I concluded many felt some time pressure. Although time pressure can be a positive influence by encouraging performance or completion in some situations, too little time can be a negative influence in other situations (Antes &

Mumford, 2009). I am concerned that the students may have felt unnecessary time pressure to complete the activities and may have felt they had taken too long generating ideas; therefore, participants may have hurried through the details of the responses.

There were no significant changes in the mean scores for originality, usefulness, or application to classroom management. The creative problem solving training was designed to teach the Osburn-Parnes Creative Problem Solving Model using the Fishbone as a strategy for guiding the brainstorming by providing a framework for organizing the thinking process of possible influential domains when solving a problem. The Osburn-Parnes model does not explicitly emphasize originality; it is more important that a solution should be useful, but not necessarily new or original.

As most experts of creativity know, original ideas are usually generated after an individual has taken time to work through the convergent ideas and is often related to the fluency of ideas. Taking time to think through ideas would generally require more than the expected hour and the participants in both groups may have been feeling some time constraints and cognitive fatigue by the end of the training sessions. If the participants felt time-constraints (e.g., were concerned about taking too much time and holding up the progression of the sessions, just wanted to finish quickly so they could leave early, or were cognitively tired because they had learned a lot of new information that they were trying to use as they completed the last of many activities), they may have not taken the time to think through all possible convergent answers to find an original answer and may have created responses based on what was quickest to recall, or the most familiar response.

There is also the possibility that the process of scoring the originality component may have also affected this score. The scoring for originality was based on expert ratings using a five point scale for rating the originality of the response, as outlined by many creativity scholars (Antes & Mumford, 2009; Amabile, 1982, 1996; Bessemer & O'Quinn, 1999; Csikszentmihalyi & Getzels, 1971;MacKinnin, 1962; Osburn & Mumford, 2006; Vincent, Decker, & Mumford, 2002), rather than traditional methods of assigning a dichotomous score (1 for an answer given by only one participant, and 0 if others had the same response), or giving credit if less than 5% gave the response (e.g., Hong & Milgram, 1991). This process of scoring may have contributed in some unknown way to the unexpected results of no significant changes between those receiving creative problem solving training and those that did not receive the training.

Finally, although there is evidence that suggests direct instruction to be creative can be a hindrance, there is also evidence to support the position that direct instruction to be creative is necessary in some cases (Chen, Kasof, Hinsel, Dimitrieva, & Xie, 2005; Harrington, 1975; Hennessey, 2001; Niu & Lu, 2009; O'Hara & Sternberg, 2000; Runco, Illies, & Eisemann, 2005; Runco, Illies, Reiter-Palmon, 2005). Based on discussions during the planning stages of this study, there were no such instructions given to either group. It is possible that, because the participants were not explicitly taught to take the time to generate an original solution or given direct instruction to be creative when completing the task, the participants did not consider this an important part of the activity and, therefore, did not engage in true divergent thinking. This is a limitation of the study and perhaps more time should be devoted to explicitly encouraging divergent thinking in future studies.

There were indications little or no thought was given to the practicality of the solution, which was measured by the Usefulness component. Approximately one-fourth of the participants summarized the problems or attempted to justify or explain possible reasons why the student was behaving as described in the scenario but provided no useful solution, which resulted in scores of 1 or 2, and another 12 participants provided solutions that had no relevance to the problem, which resulted in scores of 3. It was evident by the participant's behaviors during the creative problem solving training sessions and the responses written, participants felt obligated to write without taking time to consider possible practical solutions learned through personal experiences as a public school student or learned vicariously from other situations. For example, many students who scored 4 or 5 on the Usefulness component implied the response was a solution drawn from being a student in that grade. A frequent comment included a version of the phrase, "when I was in school, we each had a home assignment book [or journal] that we wrote our assignment in…" Based on the basic premise of Anderson's ACT-R learning theory, the memories referred to in the responses, whether practical or not, were well encoded from personal experiences as a student and could quickly and easily be associated with the problems; which could help explain why there were no significant differences in Usefulness.

The process of scoring usefulness was designed to measure the participant's ability to associate practical and ethical solutions based on the participant's expertise with the creative problem-solving model. When teaching the first substage of the final stage of creative problem solving model, participants were led to rank the ideas they had generated using the fishbone strategy. The training included explicit teaching of choosing

either the most practical or logical idea as the basis for creating a solution to the problem, which would require the participants to pull from some knowledge base such as personal experience as a student in the respective grade or of some level of classroom management knowledge. There were a mixture of both those who had received classroom management training and those who had not in both groups of the creative problem solving treatment and alternative training; so no result should be expected if the component was measuring a combination of expertise in classroom management. If there would have been a significant difference among groups, it would have more likely appeared when looking at the interaction of both creative problem solving and classroom management training; thereof, this component would have been more helpful in determining the answer to the last research question.

There were no significant changes in gain scores of the Application to Classroom Management between those in either the creative problem solving group or the creativity control group. This was to be expected. The main reason for this component was to determine the results of the second research question. The responses that were scored high (a 4 or a 5) were few for either group; indicating the participants had some previous knowledge, perhaps because some participants in both groups had received the classroom management training or maybe the participants were drawing from previous knowledge in another courses or situations.

Research Question 2

Does training in classroom management improve posttest creative problem solving performance? Results of the MANOVA and MANCOVA showed no significant differences between those who had received classroom management training and those

that had not received classroom management training. This was a surprising result, considering there was a significant difference (t (1,73) = 3.92, p =.000) between the posttest and pretest scores on the classroom management online quiz. However, the quizzes were multiple-choice items tapping specific knowledge taught in the classroom management unit. The scenarios were realistic classroom situations that required the generation of solutions rather than recognition. Apparently, few participants could make a connection between what was taught in the classroom management training and the generation of solutions for the scenarios. After careful considerations of the possible reasons for the results, I came to the conclusion that the inability to transfer information in a different context was one of at least three possible explanations for the lack of expected improvement.

The inability to transfer the information learned has been well documented in creative problem solving studies. In a study by Gick & Holyoak (1980), participants could not make the connection between a story of an army attack on the enemy and problems that required a similar solution unless the participants were explicitly told that the story held the key to solving the problems. Perfetto, Bransford, and Franks (1982) found that participants could not make the connection between statements containing information for solving problems and generating a solution if they were not explicitly told that the statements could be helpful. Holyoak (1985) posited two types of transfer of knowledge. If the information learned and the proposed problem shared surface and structural frameworks, there is a greater chance of application of the knowledge to the new situation; however, if they shared only surface features, there is a greater chance of

application of incorrect or inappropriate knowledge. Novick (1988) found similar results in three experimental studies with undergraduates and graduates.

The study I conducted aligns with this research; it is not that participants did not learn the classroom management information, but perhaps that the participants could not make the connection without cues or instruction to relate the knowledge from one context to another context. Apparently the surface and structure features were not as similar to the practice activities done in the classroom as I had thought, nor were they as similar to the ones in the creative problem solving training situations; therefore, the participants could not make the connection. Based on the pretests and posttest of the classroom management quizzes, the participants had learned the classroom management information well enough to participate in class discussions and activities and to answer questions on a test, but not well enough for the knowledge to be applied if the problem structure was different than in class activities.

Anderson's ACT-R and Novick's (1988) study of problem similarity also explain the lack of increase in gain scores of Application of Classroom Management. The participants could apply what was being taught in the creative problem solving training to the posttest task but not previous training in classroom management. The training had just been practiced and was easily recalled; but participants did not make the association between the scenarios and classroom management knowledge taught days earlier in another setting. Although there were indications that most students had learned the classroom management content, it may have been at declarative knowledge level and not at the procedural level. If the participants had not experienced enough practice for the concepts of classroom management to be at the autonomous level and the content of the

scenarios were not similar enough (i.e., they did not use learned terminology), then the participants could not create the expected responses by applying classroom management information. Additional studies that provide explicit cues for participants to try to associate the scenarios with knowledge from other coursework may help substantiate the assumption of lack of association.

When applying information learned in one setting to a new or different setting, the information must be learned at a deeper level. Based on Anderson's ACT-R theory, an individual will use the information that has been well encoded so that is automatically recalled with fewer cues. Additional studies in which participants are given more practice in the domain-specific knowledge that is more closely related to the scenarios, and studies in which explicit instruction to think about what they have learned in other classes or what they have observed from teachers in the field, may increase demonstration of successful classroom management training. Perhaps more explicit training to utilize information from many different domains or sources to generate ideas for solving a problem could also be beneficial; however studies would need to be conducted to determine the effects (Parnes, 1961).

It is also possible that the online test scores did not truly reflect student learning. The reliabilities of the two online quizzes were low due to lack of variance of some items. The students scored higher than expected on the pretest; this may be a reflection that participants had enough previous classroom management knowledge to respond correctly before training or it could indicate that the response choices on the pretests and posttests provided enough cues for the student to logically figure out the correct answers. As discussed earlier, students often referred to personal experiences for solving the

classroom management problems; therefore, it is also possible that the scores on the creative problem solving pretest and posttest may have presented problems that allowed participants to more easily rely on their previously learned classroom management knowledge and personal experience rather than their newly acquired classroom management knowledge. The personal experiences or older domain knowledge might have been more accessible, or more automatic, as proposed by Anderson's learning theory, than the newly learned material in the classroom.

Finally, like the problems of scoring addressed in the previous section, the same unforeseen scoring concerns may have contributed to the results found when looking at the data based on whether or not the participants had received classroom management training before the creative problem solving session. The participants may have not had the knowledge at the level expected by the raters.

Research Question 3

Does training in both creative problem solving and classroom management improve posttest creative problem solving performance beyond that of either training in creative problem solving or classroom management alone? The MANOVA and MANCOVA examining the interaction of the two types of training indicated no significant difference in gain scores of any of the components. As previously discussed, the participants may have felt time constraints that limited the time to appropriately think through the problems and provide original, useful solutions that could be generated by applying the knowledge learned in the two training interventions. There is also the possibility that the students did not receive or notice the cues needed to understand they were to generate creative solutions. A third possibility for the results is in the statistical

processes required for this type of design. When comparing the effect size and the observed power calculations for the interaction to those of only one intervention, the effect size and the observed power dropped; thus I do not know if the results can be considered reliable for this question. The drop in effect size and power make me to wonder if I would have gotten the same results with a larger sample for this test. As I previously discussed in the methods section, for various reasons my sample size was only about three-fourths of the available population and it was a very homogeneous group, which would also affect the outcome of the interaction.

Most importantly, this research question was based on the interaction of the two types of training; therefore, the procedures used the classroom management training sessions and scoring of the creative problem solving tasks would have greatly affected the results of the interaction calculations. Future studies that provide not only larger, more heterogeneous groups, but also revisions of the delivery of classroom management intervention, administration of the test, and improvements to the assessment process may support the hypothesis that creative problem solving coupled with classroom management training will improve preservice teacher performance of solving classroom management problems. Future studies may also consider other aspects of classroom management in which preservice teachers have less personal knowledge before receiving the classroom management training to provide a more accurate result.

Limitations of the study

In addition to the limitations mentioned in the previous section, there are also general limitations of the design of the study**.** First, the sample size was a limitation. Second, the participants were obtained through convenience sampling; thereby limiting

the possible generalization of this study. Third, the amount of time devoted to the creative problem solving intervention was limited to a very short time period. As discussed in the literature review, the more successful creative problem solving interventions were conducted over a period of days, if not weeks; thereby creating longer periods of time for between the pre-post testing. Forth, due to the short time span in administering the pretest and posttest, there was no way to distinguish the amount of learning or remembering that may have taken place from the first creative problem solving task to the second creative problem solving task; although I tried to control for that extraneous variance by counter balancing the measures and using different problems.

Implication and future studies

This study provides some indication that adding more creative problem solving training for pre-service teachers may be helpful for solving realistic classroom management problems; however, there is no indication that the learning is at a deep enough level to be applied in a public school classroom or different setting. There are indications that participants learned about classroom management at the declarative level, but did not or could not apply the information in a different setting. Longitudinal studies would be more helpful in learning the long-term effect. Research has suggested that more in-depth training and more practice increases the level of automaticity of use (Anderson, 2005); therefore longer training sessions with multiple realistic practice problems might be needed for better demonstration of learning. Other studies could also include additional information about motivation for learning creative problem solving and different models of creative problem solving strategies. It is possible that incorporating the creative problem solving training in current educational psychology

courses would provide our preservice teachers with more competency and self-efficacy in this area as they become early career teachers; which is needed, as I discussed in the first chapter. Additional studies would be needed to confirm this hypothesis.

More studies are needed to determine the long-term effects of both types of training used in this study. Providing training as preservice teachers and then conducting longitudinal studies at various intervals during first year and second year teaching would be an ideal study to see if the strategies were truly learned and useful in current classroom settings. As mentioned in the literature review, there are many models posited for educational purposes; perhaps, longitudinal studies could be done on two or more types of creative problem solving models to see which model is most effective.

Finally, the sample size was small and very homogeneous. Studies that include larger groups that are more heterogeneous could be helpful in determining true effect size; especially when looking at components in which the effect size or observed power was slightly below acceptable levels. There were occasions when the instruments indicated too little variance; this could be because the groups were too much alike or because the groups were so small.

Conclusion

Based on the literature presented in the first chapter, teaching creative problem solving and classroom management to preservice teachers is a necessity. Preservice teachers and early career teachers usually have less creative problem solving skills in the classroom where such skills are most often needed for creating effective instruction and managing classrooms. Creative problem solving skills can be taught when coupled with domain knowledge. Studies have shown these strategies to be effective in improving

problem solving in many professional settings. Combinations of training of behavioral interventions and creative problem solving have been effective for improving various aspects of classroom management, including individual student behavior management for teachers (Marchant, Robinson, Anderson, & Schadewald, 1991; Curtis & Metz, 1986).

This study has provided indication that creative problem solving can be taught; however it needs to be longer than a one hour training session. There were indications that participants had learned classroom management at the declarative level, but could not or did not think of transferring the knowledge to a different setting in which the participants were present with a realistic classroom behavior problem. Many participants were concerned with time; therefore, if the training were part of a course where the participants were less likely to feel the pressure of time constraints or the environment of a testing atmosphere, perhaps they could learn to apply both the creative problem solving strategies and the classroom management theories to generate unique and useful solutions to the classroom behavior problems. It was apparent from this study that participants needed additional instruction to synthesize and apply knowledge from one domain (the classroom management training) to another domain (creative problem solving training) in a teacher education course. This explicit instruction could be beneficial as students learn to make association between two domains. Preservice educators must develop the ability to automatically and with conscious effort synthesize and apply knowledge from many different domains to solve problems and effectively teach. This was not demonstrated by the participants in this study. I could not determine whether it was lack of procedural knowledge of the domain or whether is it was due to just the time constraints or other cognitive processing patterns.

As stated earlier there are many additional studies that need to be done in this area. Studies of different creative problem solving models to find the most effective model, longitudinal studies to determine retention of the knowledge, and studies with larger populations are foundational studies that are needed.

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Appendix A

Flow chart of

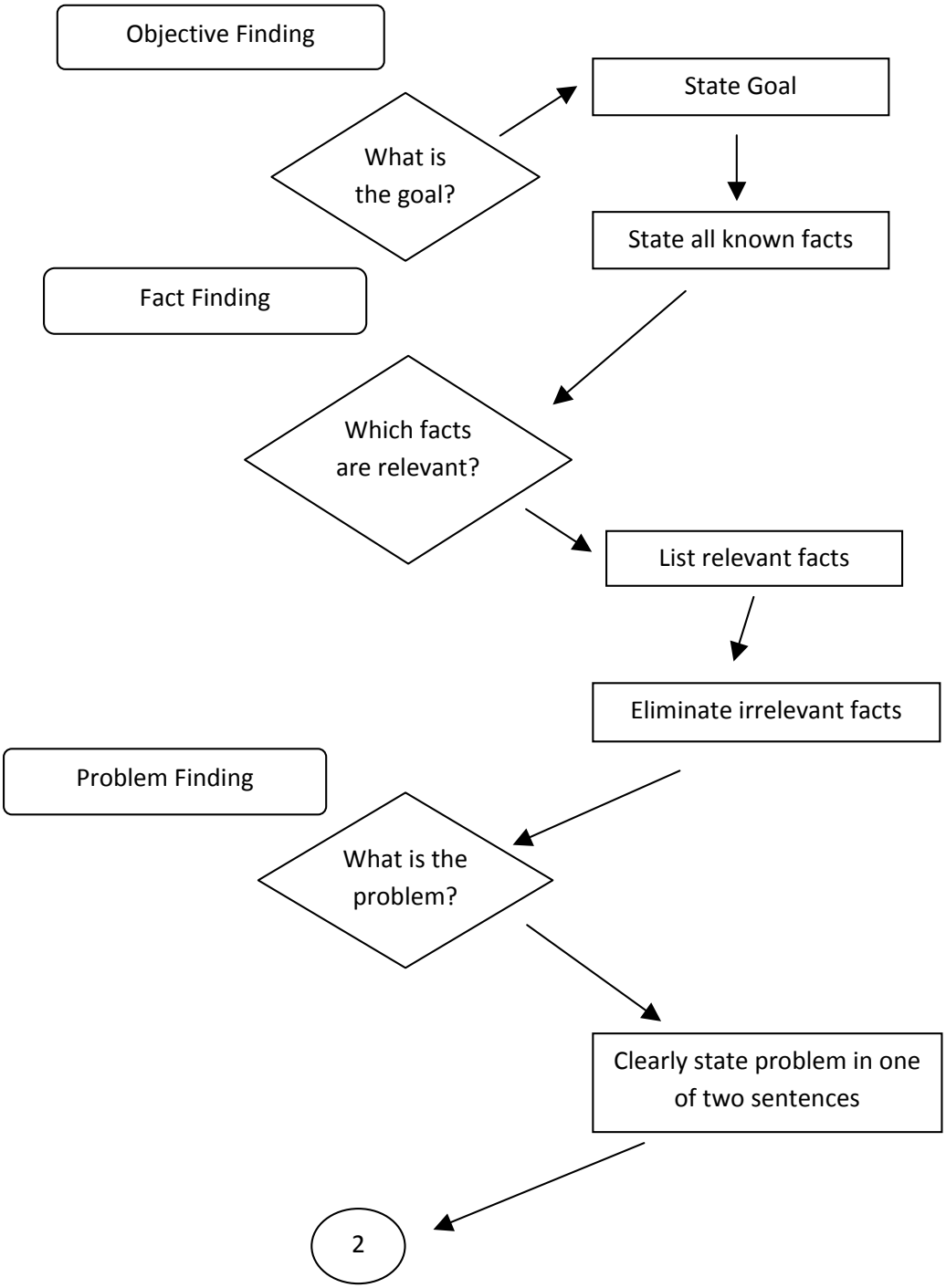
Osborn-Parnes Creative Problem Solving Model

Appendix A-1

Osborn-Parnes Creative Problem Solving Model

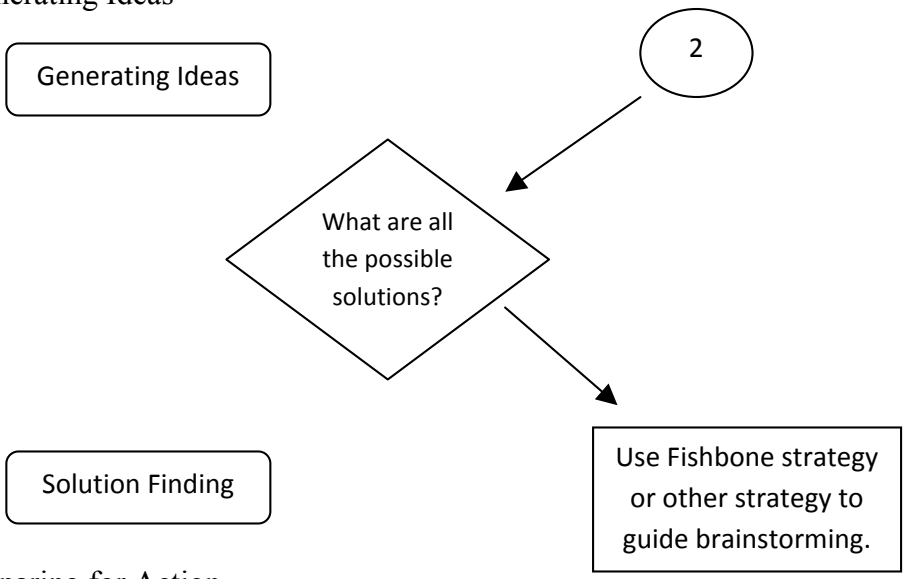
(CPS Model)

Stage 1. Identifying the Problem

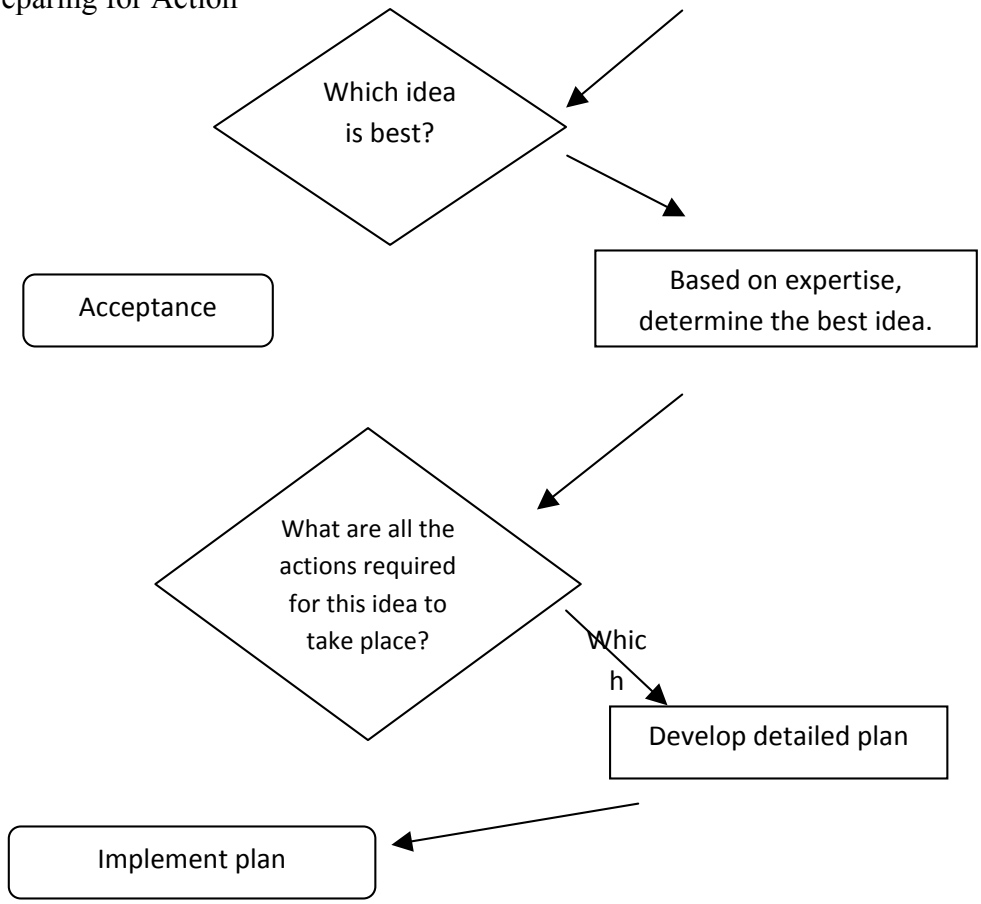


CPS Model (continues)

Stage 2. Generating Ideas



Stage 3. Preparing for Action



Appendix B

Instruments

Appendix B-1 Online Classroom Management Quizzes

Pretest for Classroom Management

1.____ Teachers at this grade level can typically concentrate on teaching the subject matter and focus less on rules of classroom behavior.

a. Early Elementary b. Middle Elementary c. High School

2. ___ Teachers of this age group spent a lot of time explaining the rules and teaching appropriate classroom behavior and explaining the rules.

a. Early Elementary b. Middle Elementary c. High School

3. ___ Which one of the following things are effective classroom managers most likely to do at the beginning of the school year? They:

a. project an authoritarian style of classroom management
b. provide a relaxed atmosphere of learning games and free time on the first day.
c. teach the rules and procedures for their class
d. present the image of a tough disciplinarian

4. ___ Which one of the following would be most helpful in establishing and maintaining appropriate behavior?

a. Target popular students to serve as examples
b. Be lenient with students at the beginning of the year.
c. Consistently enforce your classroom rules.
d. Select and use the most powerful punishments available.

5. ___ In classroom management, which of the following best represents the term "withitness?"

a. Mr. Conner lets students know he is aware of current trends.
b. Ms. Johnson knows everything going on in her classroom.
c. Mrs. Gardner avoids harsh commands when correcting students.
d. Mr. Terrell has a reputation for being a popular teacher with students.

6. ___ In classroom management, which of the following would be the best example of the term "overlapping?"

a. Mrs. Peterson runs her lecture over into the next hours.
b. Mr. Smith has students finishing one assignment in math while others are starting a science assignment.
c. Ms. Dixon keeps an eye on all the other lab stations while she helps one group set up their equipment.
d. Mr. Wilcox ties this science week's unit with this week's math unit while providing direct instruction.

7. ___ Andrea, a high school cheerleader, is lightly tapping her long fingernails on the desk in rhythm to a popular school football chant while concentrating on her in-class assignment. She is clearly disturbing the students sitting near her. According to classroom management principles, which of the following represents the best example of an effective way to communicate the problem? In response, the teachers says,
   a. "Andrea, I understand practicing the cheer is necessary for you, just don't do it while we are trying to work on our assignments in this class."
   b. "Andrea, when you tap your fingernails like that, you are being inconsiderate of the needs of others. "
   c. "Andrea, when you tap your fingernails on the desk, you are disturbing others and making it difficult for them to work."
   d. "I don't understand why you feel the need to continuously tap the school cheer. You know it is inappropriate in my class."

8. __ You have just finished a teacher-led math exercise and have assigned some practice problems for the students to work at their seats. Five minutes after completing the instructions you see Ralph starring out the window. He has made no attempt to try to complete any of the problems, while most students have finished five. According to classroom management principles, which of the following is the best way to think about Ralph's behavior?
   a. The student has a problem and the teacher should see if he/she could help
   b. The teacher needs to address this problem, it cannot be allowed to continue.
   c. This is not a problem.

9 ___ You have just finished a teacher-led discussion about the land rush in Oklahoma and the positive and negative consequences immediately before and after. You have assigned the class to write a short fictional story about being a "Sooner" during that time. As you walk around the room to monitor student work. You notice that Melisa has not completed a single sentence while most students have a very good start. According to classroom management principles, which of the following teacher reactions would be most appropriate for Melissa's behavior? The teacher should:
   a. confront Melissa about her lack of interest and inform her why she needs to get to work.
   b. ask Melissa why she hasn't attempted her work and listen carefully.
   c. ignore Melissa's behavior because it is not a problem.

10.___ While in the lunch line, Jason keeps bumping Cindy while she is trying to stand quietly and wait her turn, as she is supposed to do. Jason is really annoying Cindy. While sitting at the teacher's table, you've tried "the look" and it didn't work. According to classroom management principles, which of the following is the next best short-term strategy for dealing with Jason's behavior:

a. Ignore it.
b. Assertively remind Jason of the appropriate behavior.
c. Administer a punishment that fits the offense.
d. Try to get Jason to brain-storming possible ways to resolve the problem.

11. __ Two students sitting in the back of the room are whispering quietly and are not bothering anyone else. You've tried ignoring it, but this has been going on for over two minutes and now a third student has become involved in the conversation. According to classroom management principles, which strategy is best for dealing with the behavior?

a. Use a subtle technique like eye contact.
b. Assertively remind the students of the appropriate behavior.
c. Administer a punishment that fits the offense.
d. Try using the "no-lose" method of problem resolution

12. Ms. Howard is trying to get her 7th grade science students to complete their group experiments during the last thirty minutes of the day during the next week. For the past two days, students have often used the time to chat rather than work so the experiments were not getting done. Before letting student get into their groups on Wednesday, Ms. Howard tells her students that she will add an extra two-points to the grade if they work on their experiments during the time allotted. The groups concentrate on their experiments for the rest of the week and all experiments are ready for presentation by Friday. Which one of the following best explains why most students increased their working-in-class behavior?.

a. They underwent extinction
b. The teacher punished them
c. The teacher used positive reinforcement
d. The teacher used negative reinforcement

13. Michael, a new student, tries to get attention by continuously interrupting with unnecessary comments while you are providing direct instruction. He did this at his old school and the teacher always responded to his statements. However, you ignore his comments and continue with the lecture. After three days of you ignoring his comments, Michael now sits and listens quietly during class lectures. Michael's decrease in interrupting you is an example of what behavioral concept?
    a. He underwent extinction
    b. The teacher punished him
    c. The teacher positively reinforced him
    d. The teacher negatively reinforced him

14. Ella was 10 minutes late for class for the third time. As she entered the seventh-grade classroom she stopped at the door, smiled at the teacher and her classmates, and then proudly announced. "Never fear, Ella is here and class may now begin." She slowly took her seat and opened her notebook and then stated, "O.k. I am ready now- teach me" and giggled. The teacher topped the lecture and firmly told Ella, "You are 10 minutes tardy without an excuse. Being tardy is unacceptable behavior in my class. You will spend 10 minutes with me after school today." Ella started to protest, but instead sat down and opened her book. The teacher is using what behavioral concept to decrease Ella's behavior of being tardy?
    a. The teacher is using extinction
    b. The teacher punished her
    c. The teacher positively reinforced her
    d. The teacher negatively reinforced her

15. Paul often "forgets" to turn in his weekly book review that is due each Friday. Each time his teacher makes him go to the library study area and complete the assignment while the other students enjoy the teacher reading a story to them. His teacher knew Paul did not like going to the library and working by himself. She told him if he remembered to turn in his book review, he would not have to go to the library and write the assignment. After missing spending two Fridays in the library to complete his book reviews, Paul remembers to turn in his assignments when they are due. The teacher used what behavioral concept to increase <u>Paul's turning in his book reviews on time</u>.
    a. The teacher is using extinction
    b. The teacher punished him
    c. The teacher positively reinforced him
    d. The teacher negatively reinforced him

Appendix B-2 Online Classroom Management Quizzes

Posttest of Classroom Management

1. At which grade level are teachers more likely to include explicitly teaching classroom rules and appropriate behavior as part of the daily activities during the first few weeks of school?
   a. Early Elementary
   b. Middle Elementary
   c. High School

2. At which grade level will teachers most likely spend less time explicitly teaching rules but still have to enforce rules and remind students of expected behavior rather frequently.
   a. Early Elementary
   b. Middle Elementary
   c. High School

3. Which of the following is something a teacher would do as an effective "socializing agent?"
   a. Try to be a student's best friend
   b. Model a friendship with other colleagues by talking and laughing during lunch or breaks.
   c. Teach appropriate classroom behavior and the importance of the rules at grade appropriate level.
   d. Teachers should encourage students try be friends with all students and faculty.

4. According to classroom management principles, which one of the following things are most should teachers do at the beginning of the school year?
   a. Project an authoritarian style of classroom management
   b. Provide a relaxed atmosphere of many learning games and ample free time
   c. Teach the rules and procedures for their class
   d. Try to present the image of a tough disciplinarian

5. According to classroom management principles, which one of the following would be most helpful in establishing and maintaining appropriate behavior?
   a. Target popular students who are misbehaving to serve as examples
   b. Be lenient with students at the beginning of the year.
   c. Consistently enforce your classroom rules.
   d. Select and use the most powerful punishments available for minor misbehavior.

6. In classroom management, which of the following best represents the term "withitness?"
   a. Mr. Davis talks about current trends and popular topics with his students.
   b. Ms. Kennedy knows everything going on in her classroom and the students know she knows.
   c. Mrs. Gardner avoids harsh commands when correcting students.
   d. Mr. Terrell has a reputation for being a popular teacher with students.

7. In her classroom management class, Cathy learned about overlapping and began to notice her field observation teacher, Mr. Lincoln, used "overlapping" in his classes. Which of the following is the best example of Mr. Lincoln correctly using overlapping?
   a. Mr. Lincoln runs his lecture over into the next hour.
   b. Mr. Lincoln explicitly ties consecutive science units together so students understand the connection.
   c. Mr. Lincoln keeps an eye on all other lab stations while he helps one group set up their equipment.
   d. Mr. Lincoln ties this science week's unit to this week's math unit.

8. After Mrs. Anderson explained the required components of a five-point essay, Mitch quickly began writing. After he completed each paragraph, he began to quietly read aloud what he had written before moving on to the next paragraph. He was clearly disturbing the students sitting near him. According to classroom management principles, which of the following represents the best example of an effective way to communicate the problem? The teachers says,
   a. "Mitch, must you read every paragraph aloud?"
   b. "Mitch, when you read aloud, you are being inconsiderate of the needs of others. "
   c. "Mitch, when you read aloud, you are disturbing others and making it difficult for them to work."
   d. "Mitch, this is not a time for you to be so disruptive."

9. Corey sat quietly looking out the window while you led the class discussion of the meaning of the assigned poem. After a very productive class discussion, you assigned the students to read a similar short poem and identify the similarities and differences in the writing styles. As you walk around the room to monitor student work. You notice that Corey is still staring out the window and does not even have his book open to the correct place. Which of the following teacher reactions do you think would be most appropriate for Corey's behavior? The teacher should:
   a. confront Corey about his daydreaming and firmly state that he needs to get to work.
   b. ask Corey why he hasn't attempted the assignment and listen carefully.
   c. ignore Corey's behavior because it is not a problem.

10. Once again, Kelley tried to get Olivia's attention while she was working on her math assignment by lightly pulling her ponytail. Olivia was obviously annoyed with Kelley's behavior and she was having trouble concentrating on her work. As you helped one student on the other side of the room with a math problem, you gave Kelley "the look" and it didn't work. According to classroom management principles, which of the following would have been the best short-term strategy for dealing with the situation?
    a. Ignore it.
    b. Assertively remind the student of the appropriate behavior.
    c. Administer a punishment that fits the offense.
    d. Look at Kelley and say "Did I just see you pull Olivia's ponytail? I am shocked."

11. Two of your students walk into your sixth-grade class, talking and laughing as they take their seats next to each other. As the bells rings, the girls continue their behavior, although in lower voices. In the past, the girls have managed to control their behavior and stop talking by the time you complete the attendance sheet; however, today the girls have not stopped and you have completed taking attendance. According to classroom management principles, which strategy is best for dealing with the behavior?
    a. Ignore them and begin class; it's not your problem.
    b. Confront the girls on their "rude and unladylike behavior."
    c. In a firm voice state, "Karen and Lisa, all students are expected to quit talking when the bell rings. I need you to stop talking so other students can hear."
    d. Immediately send both girls to the principle's office with no explanation.

12. Mr. Jones is concerned about the low scores on his student's practice math quizzes. He is confident the students know the material, but do not prepare for the quizzes. On Monday, Mr. Jones announced he will each student one extra token if they increase their weekly math score by five points. Ten students increased their math score by at least five points on Friday. The teacher is using what behavioral concept to increase the likelihood students will prepare for a math quiz?
    a. The teacher used extinction.
    b. The teacher punished them.
    c. The teacher used positive reinforcement.
    d. The teacher used negative reinforcement.

13 . Eddie frequently chooses to not complete his homework as assigned each night. In fact he often does not turn in anything until Thursday. Eddie always stops to talk to the teacher about his grades each Friday. The teacher carefully goes over Eddie's grades and what he missed. In the past, Eddie has always been allowed to turn in any missed assignments with no penalty. On Monday; the teacher told him that he will deduct five points for any late assignment. After loosing 15 points in one week, Eddie stopped turning late assignments. The teacher is using what behavioral concept to decrease Eddie's being late with assignments?

a. The teacher used extinction
b. The teacher punished him
c. The teacher positively reinforced him
d. The teacher negatively reinforced him

14. Five-year –old Hailey is a very smart little kindergartener. She can answer just about any question the teacher asked, and would often burst out the answer instead of waiting to be called on. The teacher had told all the students that she cannot hear them when she has not called on them to answer the question, but Haley would not control her outburst of answers. Everyday last week Ms. Linda ignored Hailey's answers and called on other students who raised their hand to answer the question. Now Hailey raises her hand and waits to be called on to answer a question. The teacher is using what behavioral concept to decrease Hailey's outburst?

a. The teacher is using extinction
b. The teacher punished her
c. The teacher positively reinforced her
d. The teacher negatively reinforced her

15. Darby does not like to do math. Darby works quickly and is very careless in completing her assignments. Ms. Martin told Darby that she will have to redo any math assignment when she misses more than half of the problems. After having to redo two sheets, Darby works more carefully on her math assignments. The teacher is using what behavioral concept to decrease Darby's careless work behavior?

a. The teacher is using extinction
b. The teacher punished him
c. The teacher positively reinforced him
d. The teacher negatively reinforced him

Appendix B-3

Consequences Measure

Divergent Thinking

Instructions:

In this task you will be presented with 5 different questions. Please generate as many responses to these questions as possible. Each question has 4 sample responses to get you started. **Do not use the sample responses in your answers**.

You will have **2 minutes** to work on each question. The proctor will instruct you when to begin and when to stop working on each question.

Total Completion Time: 10 minutes

Before you begin, we will work through one example question.

EXAMPLE QUESTION:

What would be the results if people no longer needed or wanted sleep?

EXAMPLE RESPONSES:

1. Get more work done_____
2. Alarm clock not necessary_____
3. No need for lullaby song books_____
4. Sleeping pills no longer used_____
5. _____

Of course, there are many other possible answers that could have been written.

Please wait until you are instructed to begin.

LIST AS MANY DIFFERENT CONSEQUENCES AS YOU CAN.

What would be the results if it appeared certain that within three months the entire surface of the earth would be covered with water, except for a few highest mountain peaks?

Sample Responses:
a. Everyone will move to mountain peak.
b. Increased sale of boats.
c. Business failure
d. Panic

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

LIST AS MANY DIFFERENT CONSEQUENCES AS YOU CAN.

What would be the results if everyone lost the ability to read and write?

Sample Reponses:
a. No newspapers or magazines
b. No libraries
c. No mail or letters
d. T.V. sales increase

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

LIST AS MANY DIFFERENT CONSEQUENCES AS YOU CAN.

What would be the results if human life continued on earth without death?

Sample Reponses:
a. Overpopulation
b. More old people
c. Housing shortage
d. No more funerals

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

LIST AS MANY DIFFERENT CONSEQUENSES AS YOU CAN.

What would be the results if the force of gravity were suddenly cut in half?

Sample Responses:
a. Jump Higher
b. More accidents
c. Less effort to work
d. Easier to lift things

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

LIST AS MANY DIFFERENT CONSEQUENCES AS YOU CAN.

What would be the results if suddenly no one could use their arms or hands?

Sample Responses:
a. Learn to use feet more
b. No need for gloves
c. Clothing would be changed
d. Couldn't drive cars

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

Appendix B- 4

Creative Problem Solving Task

Directions:
Read the scenario below. Give me your best solution to the problem. Be comprehensive in your thinking and in your description of the solution.

Talking When We Should Listen
Jamie is an energetic, smart and well-liked student in Mrs. Hall's fourth grade class. Jamie routinely "forgets" to follow the rules of listening when someone else is talking. Academically, he is a very good student and can easily complete the required work with little or no individualized help from the teacher. Jamie will often answer questions before Mrs. Hall has completed the question; thus providing incorrect answers. Frequently Jamie tries to answer questions of other students for the teacher. Mrs. Hall has tried repeated verbal reprimands, loss of privileges for a day, and private one-on-one discussions. Each form of discipline has produced short-term results as Jamie promises to be more polite and follow the rule to actively listen and let others speak; however none of the techniques has proven successful for more than two or three days. Mrs. Hall needs a creative way to help this student follow the rules and learn to be polite.

Creative Problem Solving Task

Directions:
Read the scenario below. Give me your best solution to the problem. Be comprehensive in your thinking and in your description of the solution.

Turning in Assignments Promptly
Sheila is a very quiet seventh-grader who enjoys reading, math, history, and science. In her spare time, Sheila enjoys writing short stories and poems that no one ever sees. She is attentive in class and can answer questions when called upon; although she prefers not to raise her hand at any time. Sheila has five very good friends with whom she eats lunch and hangs out in the student areas. The two guys and four girls have been best friends since fourth grade. The teachers know Sheila is capable of doing her work with little or no help; but Sheila's grades do not reflect her capabilities. Although the assignments Sheila turns in are excellent and carefully done, she frequently "forgets" to turn in assignments until she has been reminded about them. If a teacher will not accept her assignment as late, Sheila finishes it and stores it in her notebook or desk without argument or concern. The teachers, her parents, and some of her best friends have talked with Sheila on many occasions about the importance of promptly turning in assignments and she always promises to be more prompt with her assignments, indicating she understands it would raise her scores. The teachers and Sheila's parents are out of ideas for getting Sheila to complete assignments in a timely manner.

Appendix B-5

Demographics and Value Statements

We'd like to know a little about you. Please provide the following information.

Gender: _____ Male _____ Female

Your age: _____

Ethnicity:
_____ African-American _____ Asian/Pacific Islander _____ Hispanic

_____ Native American/Alaskan Native _____ Caucasian/White _____ Other

Your ACT/SAT score: _____

Your current class status is:

____Freshmen ____ Sophomore _____ Junior _____Senior ___ Other

What is your Major? _____

If secondary, what is your emphasis area? _____

For each of the following statements, please indicate how true it is for you, using the following scale:

1	2	3	4
False	False in most classroom situations	True in most classroom situations	True

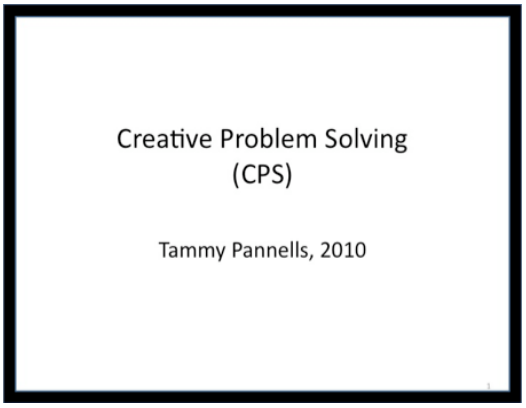
I believe a creative problem solving process would be valuable for solving classroom management problems.	1	2	3	4
I believe I could solve classroom management problems better if I used a creative problem solving process.	1	2	3	4
My solutions to classroom management problems would be improved if I used a creative problem solving process.	1	2	3	4

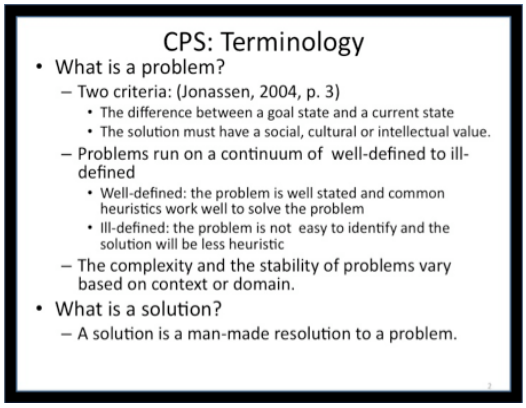
Appendix C

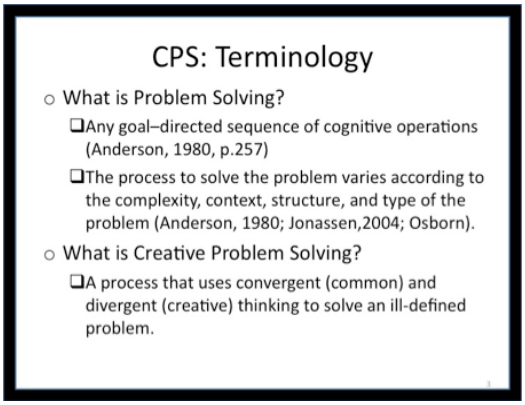
Interventions

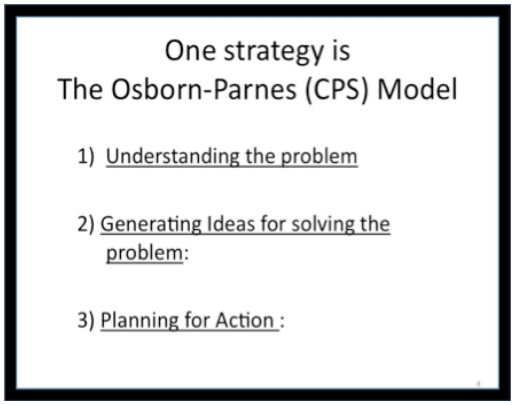
Appendix C-1

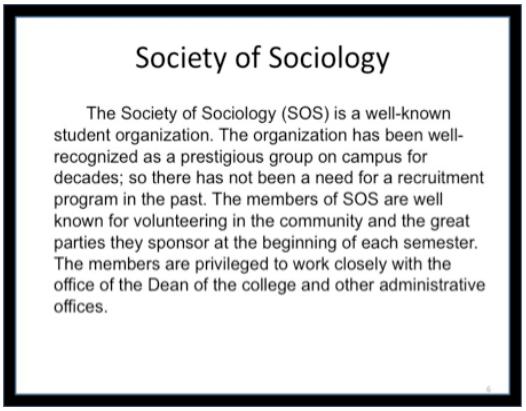
Creative problem solving intervention

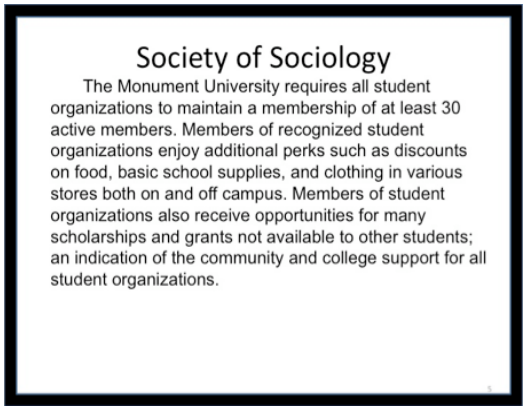












Society of Sociology

During their monthly meetings, the members learn about topics such as "surviving your 1st year" and "current job market outlooks" from prominent guest speakers. Many members know being a member of this organization can enhance their resume and chances of getting a better job because of the networking opportunities with peers, faculty, and prominent business owners in the community.

7

Society of Sociology

Although the number of students majoring in sociology remain relatively consistent each year, membership continues to drop and the organization may fold. The current officers are trying to make sure the organization doesn't fold.

8

Understanding the Problem

- Mess Finding:
  - Identifying problems in a mess. This process finds the real problems in the situation.
  - What are the problems in this story?
    - Sternberg suggests asking the five W's
      - Ask:
        - » Who?
        - » What ?
        - » Where?
        - » When?
        - » Why?

9

Understanding the Problem

Data Finding

- Gathering the details and finding the most important. Clear out the irrelevant details.
- List the relevant details or facts in the story.
  - Find just the facts that are relevant
  - Sometimes there is unnecessary information
    - Ignore it

10

Understanding the Problem

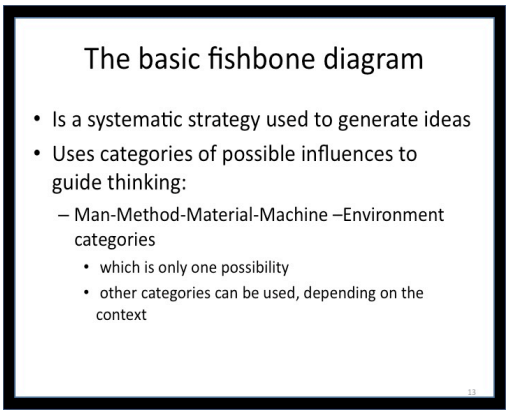
- Problem Finding:
  - Clarifying and stating the specific problem.
    - What is the one main problem?
      - Look at all the possible problems identified in the first step.
        - » Is there one definite problem stated or
        - » Do all the problems listed imply a bigger problem that is not stated
        - » Or are there several independent problems that are contributing to situation

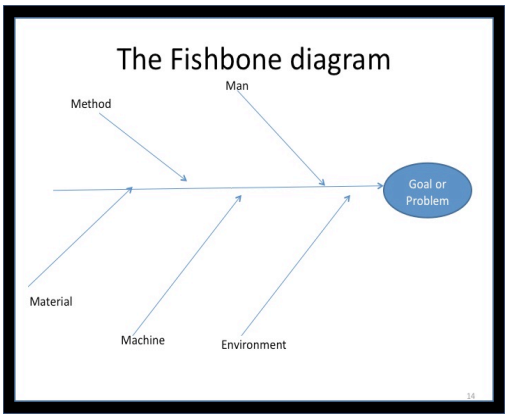
11

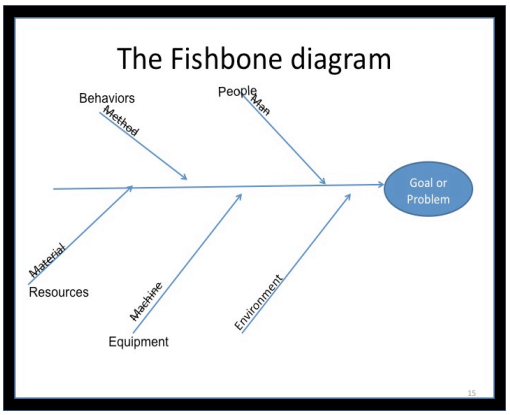
Generating Ideas

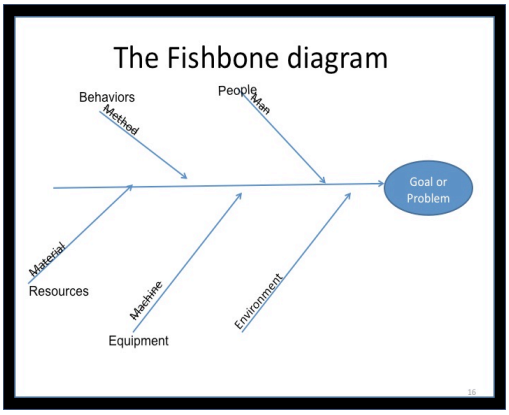
- There are many strategies for this process
- One systematic technique commonly used is the *Fishbone:*
  - The Fishbone
    - is a skeletal diagram that lets you organize your ideas.
    - is versatile for numerous context
    - can be revised as needed to help generate idea more ideas

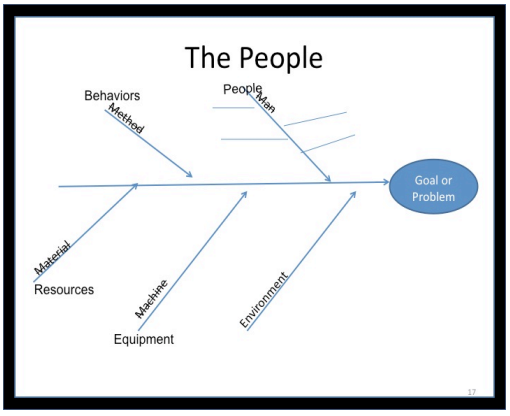
12

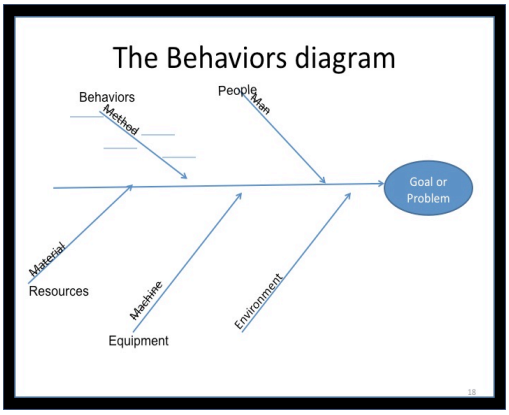

The basic fishbone diagram
• Is a systematic strategy used to generate ideas
• Uses categories of possible influences to guide thinking:
– Man-Method-Material-Machine –Environment categories
• which is only one possibility
• other categories can be used, depending on the context
13


The Fishbone diagram
Man
Method
Goal or Problem
Material
Machine
Environment
14

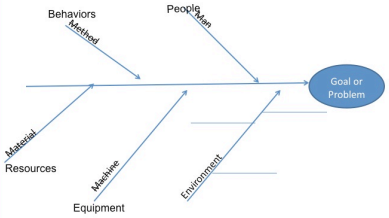

The Fishbone diagram
Behaviors
Method
People
Man
Goal or Problem
Material
Resources
Machine
Equipment
Environment
15


The Fishbone diagram
Behaviors
Method
People
Man
Goal or Problem
Material
Resources
Machine
Equipment
Environment
16


The People
Behaviors
Method
People
Man
Goal or Problem
Material
Resources
Machine
Equipment
Environment
17


The Behaviors diagram
Behaviors
Method
People
Man
Goal or Problem
Material
Resources
Machine
Equipment
Environment
18

The Environment diagram



19

Deciding on the idea

- Go back and circle the ideas that are most appealing to you as either easiest or most logical

20

Now, the final step of CPS

- Plan for Action: A solution isn't real until it is applied.
  - What are all the possible ideas that could applied to solve the problem?
  - Rank them in order starting with easiest to implement.
- Choose one to implement

  The decision can be based on easiest or expert judgment of which is most likely to work

21

Is it Solved?

- If this were a real situation, after you had decided on which idea to use, you would design and implement a plan
  - The steps to be implemented
    - When to start
    - How to evaluate the outcome
    - Frequency of evaluation
- Often employees in industries and organization use this technique; always keeping more than one option ready in case the first option does not prove successful or in case similar situations occur.
  - This process can be used in almost ANY context from personal to any profession.

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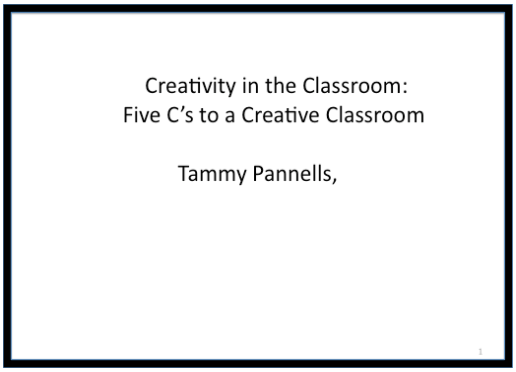
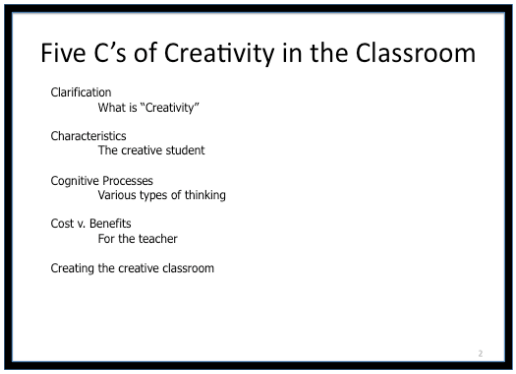
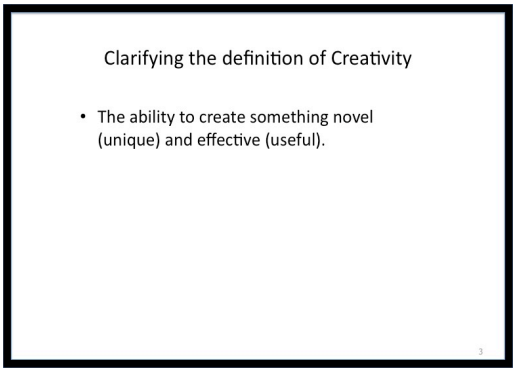
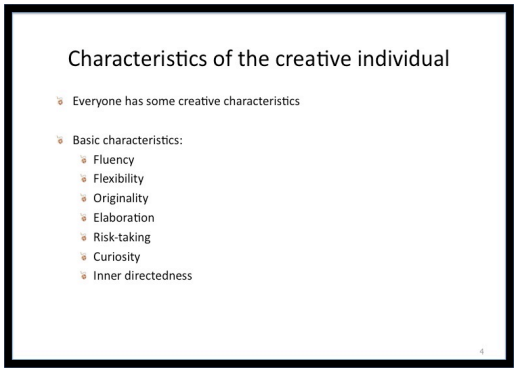
Appendix C-2

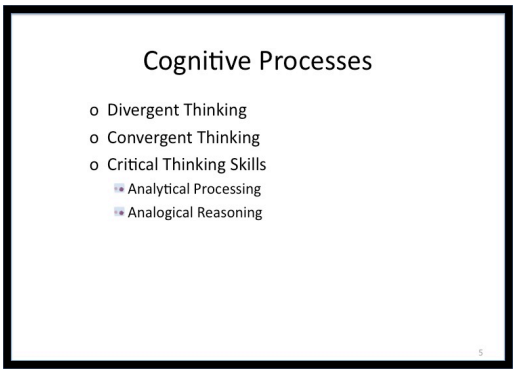
Creativity Control Treatment Interventions

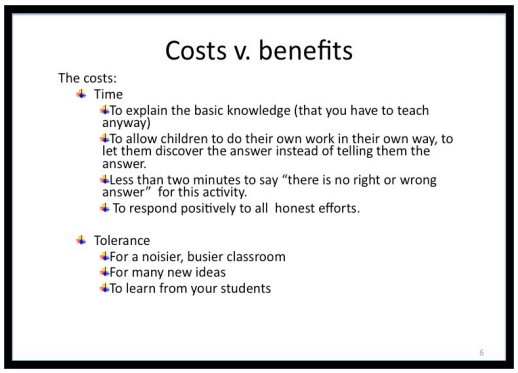


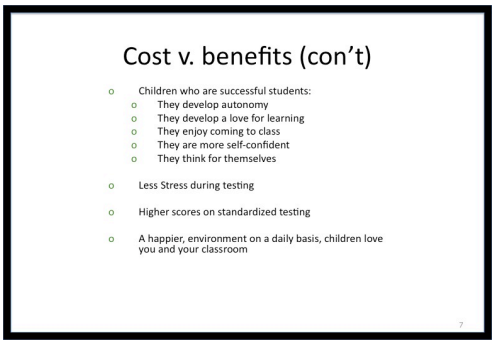


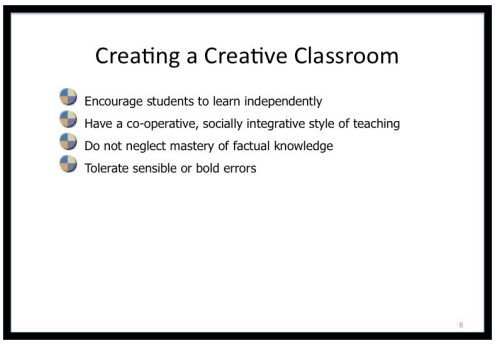


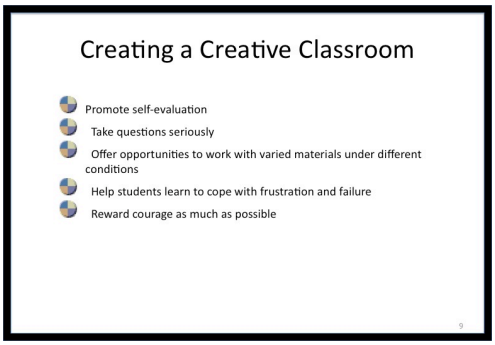







Cost v. benefits (con't)
Children who are successful students:
They develop autonomy
They develop a love for learning
They enjoy coming to class
They are more self-confident
They think for themselves
Less Stress during testing
Higher scores on standardized testing
A happier, environment on a daily basis, children love you and your classroom
7


Creating a Creative Classroom
Encourage students to learn independently
Have a co-operative, socially integrative style of teaching
Do not neglect mastery of factual knowledge
Tolerate sensible or bold errors
8


Creating a Creative Classroom
Promote self-evaluation
Take questions seriously
Offer opportunities to work with varied materials under different conditions
Help students learn to cope with frustration and failure
Reward courage as much as possible
9